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ABSTRACT

This module (part of a series of 24 modules) is education program, on fostering students' growth in reading skills. The genesis of these materials is in the 10 "clusters of capabilities," outlined of Public Law 94-142 to Teacher Education." These clusters form of Public Law 94-142 to Teacher Education." These clusters form the proposed core of professional knowledge needed by teachers in the future. The module is to be used by teacher educators to reexamine and enhance their current practice in preparing classroom teachers to work competently and comfortably with children who have a wide range of individual needs. The module includes objectives, scales for assessing the degree to which the identified knowledge and practices are prevalent in an existing teacher education program, and self-assessment test items. A bibliography and journal articles are included on the knowledge and competencies teachers need to build good literacy skills beyond the beginning level. (JD)

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# THE CLASSROOM TEACHER'S ROLE IN READING INSTRUCTION IN THE INTERMEDIATE AND SECONDARY GRADES

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Extending the Challenge:

Working Toward a Common Body of Practice for Teachers

Concerned educators have always wrestled with issues of excellence and professional development. It is argued, in the paper "A Common Body of Practice for Teachers: The Challenge of Public Law 94-142 to Teacher Education,"* that the Education for All Handicapped Children Act of 1975 provides the necessary impetus for a concerted reexamination of teacher education. Further, it is argued that this reexamination should enhance the process of establishing a body of knowledge common to the members of the teaching profession. The paper continues, then, by outlining clusters of capabilities that may be included in the common body of knowledge. These clusters of capabilities provide the basis for the following materials.

The materials are oriented toward assessment and development. First, the various components, rating scales, self-assessments, sets of objectives, and respective rationale and knowledge bases are designed to enable teacher educators to assess current practice relative to the knowledge, skills, and commitments outlined in the aforementioned paper. The assessment is conducted not necessarily to determine the worthiness of a program or practice, but rather to reexamine current practice in order to articulate essential common elements of teacher education. In effect then, the "challenge" paper and the ensuing materials incite further discussion regarding a common body of practice for teachers.

Second and closely aligned to assessment is the developmental perspective offered by these materials. The assessment process allows the user to

*Published by the American Association of Colleges for Teacher Education, Washington, DC, 1980.

view current practice on a developmental continuum. Therefore, desired or more appropriate practice is readily identifiable. On another, perhaps more important dimension, the "challenge" paper and these materials focus discussion on preservice teacher education. In making decisions regarding a common body of practice it is essential that specific knowledge, skill and commitment be acquired at the preservice level. It is also essential that other additional specific knowledge, skill, and commitment be acquired as a teacher is inducted into the profession and matures with years of experience. Differentiating among these levels of professional development is paramount. These materials can be used in forums in which focused discussion will explicate better the necessary elements of preservice teacher education. This explication will then allow more productive discourse on the necessary capabilities of beginning teachers and the necessary capabilities of experienced teachers.

In brief, this work is an effort to capitalize on the creative ferment of the teaching profession in striving toward excellence and professional development. The work is to be viewed as evolutionary and formative. Contributions from our colleagues are heartily welcomed.

This paper presents one module in a series of resource materials which are designed for use by teacher educators. The genesis of these materials is in the ten "clusters of capabilities," outlined in the paper, "A Common Body of Practice for Teachers: The Challenge of Public Law 94-142 to Teacher Education," which form the proposed core of professional knowledge needed by professional teachers who will practice in the world of tomorrow. The resource materials are to be used by teacher educators to reexamine and enhance their current practice in preparing classroom teachers to work competently and comfortably with children who have a wide range of individual needs. Each module provides further elaboration of a specified "cluster of capabilities"--in this case, fostering students' growth in reading skills.

THE CLASSROOM TEACHER'S ROLE IN
READING INSTRUCTION IN THE
INTERMEDIATE AND SECONDARY GRADES

Among the ten clusters of capabilities listed in "A Common Body of Practice for Teachers: The Challenge of Public Law 94-142 to Teacher Education," Teaching Basic Skills is the second cluster dealt with. Not surprisingly, reading is the first basic skill considered. The authors state that

> All teachers should be able to teach literacy skills from beginning up to at least fifth grade level and be proficient in instruction which maintains and advances good literacy skills at advanced levels. (p. 22)

The content of this module is particularly targeted at that latter cluster of skills, at alerting teacher educators to the knowledge and competencies teachers need to build good literacy skills beyond the beginning level. The module is written with the firm belief that, as the authors of the "Challenge" paper further state,

> Regardless of what speciality area of teaching they may be in, teachers should be skilled in introducing new vocabulary, [and] creating the "set" for appropriate forms of reading comprehension.... (p. 22)

The knowledge base segment of this module is divided into four major sections. The two longest sections--that on vocabulary and that on comprehension--deal directly with the two topics mentioned in the above quotation, teaching vocabulary and preparing students to read specific selections. The section on comprehension also deals with preparing students to effectively read the variety of texts they will encounter in their future reading.

The two shorter sections of the knowledge base segment of the module deal with some theoretical considerations about the reading process and the recent research on teacher effectiveness. The reading process has been extensively studied by educators, linguists, and psychologists for about the past fifteen years, and a large number of theories about the process have emerged from this work. Three theretical notions which are particularly relevant to teaching reading to intermediate and secondary students are introduced here. The most common findings of the recent research on teacher effectiveness also have a good deal of import for reading instruction, and these are summarized here.

Of course, the treatments of teaching vocabulary, teaching comprehension, theories of reading, and teaching effectiveness must necessarily be brief in this module. The references and bibliography that follow the knowledge base and the papers included at the end of the module provide beginning points for further reading on all of these topics.

Other modules in the total set which are related to this topic include:

Curriculum-based assessment and evaluation procedures

Curriculum assessment and modification

Classroom strategies for accommodating exceptional learners

CONTENTS

Page

Set of Objectives - The objectives focus on the teacher educator rather than the student (preservice teacher). They identify what can be expected as a result of working through the materials. They are statements about skills, knowledge, and attitudes which should be part of the "common body of practice" of all teachers . . . . . viii

Rating Scales - Scales are included by which a teacher educator could, in a cursory way, assess the degree to which the knowledge and practices identified in this module are prevalent in the existing teacher-training program. The rating scales also provide a catalyst for further thinking in each area. . . . . x

Self-Assessment - Specific test items were developed to determine a user's working knowledge of the major concepts and principles in each subtopic. The self-assessment may be used as a pre-assessment to determine whether one would find it worthwhile to go through the module or as a self check, after the materials have been worked through. The self-assessment items also can serve as examples of mastery test questions for students. . . . . xi

Answers to Self-Assessment - The answers to the true-false self-assessment items are presented on the page following the assessment. . . . . xiv

Rationale and Knowledge Base - This section presents several theories about the reading process, summarizes the results of recent research on effective teaching, and provides fairly detailed information on teaching vocabulary and teaching reading comprehension. . . . . 1

Bibliography - A brief, annotated bibliography of useful books is included after the list of references. . . . . 71

Articles - Six articles (reproduced with authors' permission) accompany the aforementioned components. The articles are referred to at appropriate points within the rationale and knowledge base and support and expand on the knowledge base. . . . . 72

## Objectives for the Module

The purposes of the module are:

1. To provide a framework and a body of content that could form the basis of an instructional program to prepare intermediate and secondary school teachers to provide appropriate reading instruction in their classrooms.

2. To provide an introduction to three theoretical constructs about the reading process which have particularly important implications for reading instruction.

3. To summarize the major instructional principles which have emerged from the recent research on teacher effectiveness.

4. To describe the types of reading vocabulary that need to be taught, principled way of selecting the various types of words that need to be taught, and appropriate procedures for teaching each type of word.

5. To describe a comprehensive plan for assisting students in reading, comprehending, and remembering specific texts.

6. To describe several methods of improving students' general ability to comprehend what they read, that is, to describe methods of fostering generative comprehension skills.

7. To provide teacher educators with several papers, a list of references, and a brief bibliography that will enable them to pursue each of these topics further.

Reasonable Objectives for Teacher Education Programs

At the completion of the teacher education program, students should be able:

1. To specify the academic conditions under which student achievement is enhanced.

2. To select appropriate reading vocabulary for instruction.

3. To demonstrate effective procedures for teaching vocabulary.

4. To develop and carry out an effective plan for assisting students in reading, understanding and remembering the contents of a given school text.

5. To employ effective strategies for improving students' general abilities to comprehend reading matter.

RATING SCALE FOR TEACHER PREPARATION PROGRAM

1. _____ Coursework in teaching reading is required only for elementary and remedial reading teachers.

2. _____ All students receive basic coursework in reading instruction with the major focus being on the development and assessment of word recognition skills.

3. _____ Students are taught that responsibility for reading instruction belongs to all teachers and learn how student characteristics, nature of materials, nature of the task, and type of instruction interact to produce academic outcomes, but they are not taught intervention strategies.

4. _____ Students are taught that responsibility for reading instruction belongs to all teachers and learn how student characteristics, nature of materials, nuature of the task, and type of instruction interact to produce academic outcomes; they are also taught appropriate assessment and intervention strategies.

5. _____ Students are taught that responsibility for reading instruction belongs to all teachers; they learn how student characteristics, nature of materials, nature of the task, and type of instruction interact to produce academic outcomes, and they learn and practice appropriate assessment and intervention strategies.

-x-

## SELF ASSESSMENT

Short Answer Questions

The followign questions are intended for readers who have at least some knowledge of the topics discussed here. They can be answered at various levels of specificity and are answered in some detail in the rationale and knowledge base section of the module. For readers who have very little knowledge of the topics discussed here, these questions will probably best serve as a post-assessment.

1. Name the major areas that ought to be covered in a course designed to prepare classroom teachers to provide appropriate reading instruction for students in the intermediate and secondary grades.

2. Define schemata and give a brief example of a schema that most adults probably have.

3. Distinguish between interactive models and both bottom-up and top-down models of the reading process.

4. Explain why automaticity is crucial to getting meaning from reading.

5. List six specific principles that have emerged from the research on teaching effectiveness.

6. Describe the four types of reading vocabulary that need to be taught.

7. Present a specific method for teaching words that are in neither the student's reading vocabulary nor his or her reading vocabulary but for which he or she has an available concept or for which a concept can be built.

8. Distinguish between "learning from text" and "learning to learn from text" and identify a teaching activity that would be appropriate for each of these goals.

9. Name four sorts of prereading activities that could appropriately be used with intermediate or secondary school students.

10. Define metacognition and give an example of a situation in which a reader is appropriately using metacognitive skills and another in which a reader is not using metacognitive skills.

True-False Questions

The following questions are very specific and are intended for readers who definitely have some knowledge of the topics discussed here. For readers who are not familiar with the topics discussed here, these questions will best serve as a post-assessment. Answers to these questions are shown on the following page.

1. _____ In a sense, schemata are similar to scripts of plays.

2. _____ Schemata cease to develop once a person reaches about age 20.

3. _____ In the interactive model, low level information plays a much greater role than high level information.

4. _____ Both word recognition and lexical access processes are generally automatic for the fluent reader.

5. _____ In direct instruction the teacher is distinctly in charge of what goes on in the classroom.

6. _____ Most of the studies supporting the direct instruction approach have been conducted with elementary school children.

7. _____ One of the major findings of the teaching effectiveness research is that students need to be challenged more than they currently are.

8. _____ Multiple meaning words are the most difficult type of word to teach.

9. _____ The Living Word Vocabulary provides specific information about what words intermediate and secondary students do and do not know.

10. _____ Most teachers probably emphasize prereading instruction more than they should.

11. _____ Attempts to teach text structure have demonstrated that teaching text structure can facilitate comprehension.

12. _____ SQ3R stands for Study, Question, Reread, Review, and Reread.

## ANSWERS TO TRUE-FALSE QUESTIONS

1. True
2. False
3. False
4. True
5. True
6. True
7. False
8. False
9. True
10. False
11. True
12. False

# THE CLASSROOM TEACHER'S ROLE IN READING INSTRUCTION IN THE INTERMEDIATE AND SECONDARY GRADES*

The years following the passage of Public Law 94-142, the Education for All Handicapped Children Act of 1975, have been as important in the field of reading as they have in special education. This is not because our conception of reading and reading instruction has changed radically from what it was a few years ago. It is instead because our understanding of the reading process is much fuller than it was a few years ago, our reasons for employing certain sorts of instruction rather than other sorts are much better articulated than they were a few years ago, and the empirical evidence for both our theories and our instructional techniques is radically stronger than it was even a few years ago. This is, of course, not to say that every person in the field of reading holds precisely the same view. The view of reading and reading instruction that is presented here is ultimately that of one person. Nevertheless, I firmly believe that the majority of my colleagues would endorse the view presented here and that it is thus an appropriate position on which to base a common body of practice for teachers.

*I wish to sincerely thank Jim Cunningham and Steve Koziol for their very thorough reviews of this section of the module, Charlie Lakin for his editorial suggestions, and Bonnie Warhol for typing the module.

Before presenting this view of the classroom teacher's role in reading instruction, I will describe the sorts of teachers and classes being considered, note some of the aspects of reading instruction that are not considered here, and give a brief overview of what follows. The teachers of concern here are regular classroom teachers teaching classes of thirty or so students in grades 4 to 12. I assume that the majority of such classes are quite heterogeneous, whether or not they contain students who are specifically designated as being mainstreamed. For example, a typical 7th grade class of thirty students is likely to include something like two students reading at grade levels 2-3, another three students reading at levels 4-5, twenty students reading within two levels of their actual grade, and another five students reading two or more levels above grade. I also assume that in addition to any sort of reading instruction they provide, these teachers have a good deal of content in areas such as science, social science, and literature to teach. Of course, this is somewhat more the case with secondary teachers than with elementary teachers, but only somewhat more the case. Finally, I assume that because these teachers teach thirty or so students, and in many cases five classes of thirty or so students, they have a limited amount of time in which to plan activities. Because of this assumption, the instructional activities suggested here do not require impossible amount of the teacher's time to prepare.

The aspects of reading instruction that are not considered here are beginning reading instruction and assessment of reading skill. With regard to beginning reading instruction, the principal topics not considered here are the teaching of letter-sound correspondences, instruction in segmenting words into their component parts, and instruction in blending. This does not mean that these topics are unimportant. They are tremendously important. As Mathews

(1966) puts it in his interesting and excellent history of reading instruction, "No matter how the child is taught to read, he comes sooner or later to the straight gait and the narrow way: he has to learn letters and the sounds for which they stand" (p. 206). Most children will have learned letter-sound correspondences, segmentation, and blending in the primary grades. If older children have not learned them, they need help--the best help we can provide just as soon as possible. However, describing such instruction is beyond the scope of this paper and requires time that most classroom teachers do not have. For those interested in pursuing this topic further, Durkin (1981) offers some excellent advice.

Assessment of reading skills is not considered here because the topic is dealt with to some extent in another module in this series (Hofmeister & Preston, 1981) and because a thorough treatment of the topic requires more space than is available here. However, much of the instruction discussed here presupposes that teachers have determined their students' strengths and weakness in reading, at least at a relatively general level. Schreiner (1979) and Pikulski and Shanahan (1982) provide practical treatments of assessment.

The remainder of this paper is divided into five sections. In the first section, I discuss several theories dealing with the reading process. In the second section, I report the results of a large body of recent research on what constitutes effective teaching. In the third section, I present specific methods of teaching vocabulary. In the fourth section, I present a plan for facilitating students' comprehension of specific selections and discuss several approaches to fostering generative comprehension skills. Finally, the last section is a brief summary.

## Some Theoretical Considerations about the Reading Process

Three theoretical considerations undergird much of the current thinking about the reading process and the teaching of reading. These are schema theory, the interactive-compensatory model of reading, and the concept of automaticity. These are not, I want to emphasize, bundles of fluff primarily valuable in keeping academics off the welfare roles. They are instead well-conceived and rather thoroughly researched constructs that have direct implications for teaching. They say a good deal about what one is teaching when he or she is teaching reading, a good deal about how to teach reading, and a good deal about how not to teach reading. I will consider each of these theoretical considerations in turn.

### Schema Theory

Almost certainly the most pervasive influence on current thinking about the reading process is the notion of schemata. As described by Rumelhart (1980), probably the most prolific and readable writer on the topic, schemata are chunks of knowledge that exist in our heads. All of our knowledge is packaged into these units. Schemata operate in all of our attempts to make sense out of the world. We use them in "interpreting sensory data (both linguistic and nonlinguistic), in retrieving information from memory, in organizing actions, in determining goals and subgoals, in allocating our (mental) resources, and generally in guiding the flow of processing in the system" (p. 34). Schemata constitute our knowledge about "objects, situations, events, sequences of events, actions, and sequences of actions" (p. 34). Schemata are prototypes or models of reality that enable us to deal with the incredible complexity of reality without becoming overburdened with the myriad of details that any reality exhibits.

In his attempt to explain schemata, Rumelhart uses a number of analogies, the most fruitful of which is that between a schema and the script of a play. In the same way that a play has a set cast of characters that can be played by different actors in quite different ways without changing the essential nature of the play, so a schema has a set of variables that can be given different values in individual realizations of the schema without changing the essential nature of the schema.

Consider the schema for the concept buy, one of several examples that Rumelhart uses:

> One can imagine a playwright having written a most mundane play in which the entire play consisted of one person purchasing some object from another person. At minimum, such a play must have two people, some merchandise, and some medium of exchange. Whatever else happens, at the outset of the play one character (call him or her the PURCHASER) must possess the medium of exchange (call it the MONEY). The second person, the SELLER, must possess the object in question, the MERCHANDISE. Then, by some interaction (BARGAINING) a bargain is struck and the SELLER agrees to give the MERCHANDISE to the PURCHASER in exchange for a quantity of the MONEY. (1980, p. 35)

There are, of course, a great number of realizations of this buy schema, that is, a number of ways in which the variables in the schema can vary. The PURCHASER can be a child, an adult, the members of a club, the University of Minnesota, or the U.S. Government. The MERCHANDISE can be a pack of gum, an automobile, the services of a tennis pro, 10,000 reams of ditto paper, or half a million barrels of oil. The SELLER, like the PURCHASER, can be a child, an adult, the members of a club, the University of Minnesota, or the U.S. Government. And the MONEY can be dollars, lire, pounds, a check, a credit card, or a purchase order. But regardless of just how these variables are realized, they do have to be present if the play is to be a realization of the buy schema. If one or more of these factors is not present, then the scenario is

probably not an instance of the buy schema. If, for example, the MONEY variable is missing, then we may have an example of the give schema, or perhaps the take schema, or even the steal schema.

Moreover, the presence of particular variables (the PURCHASER, the MERCHANDISE, the SELLER, and the MONEY) does not in itself guarantee an instance of a particular schema. In addition to being present, the variables of a particular schema have certain limits. They can only vary so much. These limits are referred to as variable constraints. These variable constraints seem to be of two sorts, one of which might be called "fixed" and the other of which might be called "conditional." I will define and give an example of each. A fixed constraint is a constraint on a particular variable that holds regardless of the value of the other variables. For example, the PURCHASER cannot be a nail, or a tree, or bananas flambe. PURCHASERS need to be animate; more specifically, outside of cartoons at least, they need to be human.

A conditional variable constraint is a constraint on one variable of the schema that is dependent on the values of other variables in the schema. For example, the value assigned to the MERCHANDISE puts constraints on the value that can reasonably be assigned to the PURCHASER. Thus, if the MERCHANDISE is a pack of gum, the PURCHASER can reasonably be a fourth grader but not the University of Minnesota. Conversely, if the MERCHANDISE is 10,000 reams of ditto paper, then the PURCHASER can reasonably be the University of Minnesota or Nelson's Office Supply but not a fourth grader.

One further notion regarding the variables of a schema needs to be mentioned. This is the concept of default values. Default values are the values that we assign to the variables of a schema when we are not given all of the variables of the

schema or all of the values of the variables of the schema. Default values make guesses, predictions, or inferences possible so that we can make sense out of an experience. We are able to assign these default values to the experience because of the existence of appropriate schemata in our minds. For example, most American students have a rich schema for professional football. An author need only state, "They went to the Vikings game that night," to conjure up a rich store of concepts in the reader. Lacking information to the contrary, readers will assume that tickets to the game will be quite expensive, most of the players will weigh over two hundred pounds, the game will be played before thousands of fans, and a myriad of other details.

Up to this point, I have been comparing schemata to scripts of plays. Here, I want to note several ways in which they are not like the script of a play. First, they are not just concerned with people and events. There are, as noted earlier, schemata for "objects, situations, events, sequences of events, actions, and sequences of actions." I have a schema for the letter A, a schema for the concept of practical joke, a schema for how I get home from work, and a schema for beauty.

Second, unlike scripts of plays, schemata are active processes. They are not just there and available. They are recognition devices which actively work to evaluate the fit between the information perceived and themselves. That is, schemata are actively involved in the process of determining whether or not the information perceived can be interpreted in terms of a particular schema. Schemata direct the process by which the mind takes a particular piece of information presented to our senses, calls up a particular schema in terms of which the information

can potentially be interpreted, checks for the congruence between the incoming information and the variables of the schema, and either determines that the information can be interpreted in terms of that schema or calls up another schema to be tested.

There is certainly a lot more that could be said about schemata, but I believe that enough has been said to convey the importance of the concept for those concerned with reading. The importance of the concept is just this. It lays incredible stress on readers having and accessing appropriate schemata for anything they attempt to read. Of course, in one sense, there is not much new here. There has always been a fair amount of recognition of this fact. But according to the theory, a fair amount of recognition is not enough. Schema theorists have repeatedly demonstrated that the reader can only make sense out of what he or she is reading by bringing into play a huge store of schemata. The background knowledge necessary to understand even the simplest text is frequently enormous, and if the reader lacks that knowledge, he or she simply will not be able to interpret the text.

Several additional implication of schema theory have been pointed out by Cunningham (1982). It is because of schema theory that "we now understand that inability to reason and infer is not so much a lack of intellect as it is a lack of relevant knowledge." It is because of schema theory that "rather than concluding that students are stupid, teachers can recognize that they are ignorant, the usual remedy for which is education." And it is because of schema theory that we now recognize that rote learning of definitions and explanations does not appropriately build knowledge and that information must be presented in a

variety of contexts if students are to build the sort of rich networks of schemata that are vital to effective reasoning.

The Interactive-Compensatory Model of Reading

The interactive-compensatory model of reading presents a number of concepts closely related to the concepts of schema theory. The model is extremely important to consider in conjunction with schema theory because it serves to prevent a misconception that one might have if only schema theory were considered. Schema theory puts great emphasis on the part that information the reader already possesses plays in his or her interpretation of what is read. To some degree then schema theory de-emphasizes the role that the text plays in influencing our interpretation of what we read. Such an emphasis on what has been called "conceptually driven processing," processing in which the mind or our schemata play a major role, and the corresponding de-emphasis on what has been called "data-driven processing" is to some degree appropriate. There was a time when reading theorists and reading teachers gave little attention to the fact that much of what we understand when we read a text is influenced by our existing schemata. However, saying that our schemata heavily influence our understanding of a text definitely does not mean that the text plays no part.

As Rumelhart (1977) and Stanovich (1980) have explained, interactive models can be best understood when contrasted to what have been called "bottom up" and "top down" models. Bottom up models assume that the text is singularly important and that the reader processes text by first recognizing lower level units and then repeatedly synthesizing lower level units into more and more complex units. In this view, the reader might first perceive letters, then synthesize several letters to form words, then synthesize several words to form a phrase, and so on.

The point is that in this view the processing operates in a single direction--from the text to the reader. Top down models are the antithesis of bottom up models. Top down models assume that the reader is singularly important and that the fluent reader processes text by first hypothesizing about the content of the text and then selectively sampling the text to confirm or disconfirm the hypotheses. In this view, the reading process begins with the highest level unit possible, meaning in the mind of the reader, and deals with lower level units, for example words, on to a limited extent. Again, the point is that processing operates in a single direction--but in this view it is from the reader to the text.

As Stanovich (1980) notes, interactive models "posit neither a strictly bottom-up nor strictly top-down processing, but instead assume that a pattern is synthesized based on information provided simultaneously from several knowledge sources" (p.35). These knowledge sources, levels at which processing takes place, include letter level knowledge, word level knowledge, syntactic knowledge, and knowledge of the meaning of sentences and larger units. In interactive models, knowledge at the level of meaning both constrains the values the reader can assign to lower level units and is itself constrained by lower level analyses that are simultaneously taking place. Thus, as Stanovich further notes, "each level of processing is not merely a data source for higher levels, but instead seeks to synthesize the stimulus based on its own analysis and the constraints imposed by both higher and lower-level processes" (p. 35).

Thus far I have discussed the interactive aspect of the interactive-compensatory model but have said nothing about the sense in which the model is compensatory. Stanovich, West, and Feeman (1981) explain that the model is compensatory in "that deficiencies in processes at a particular level in the processing hierarchy can be compensated for by a greater use of information

from other levels, and that this compensation takes place irrespective of the level of the deficient processes" (p. 189).

As will be explained in detail in the comprehension section of this module, teachers can make good use of the fact that students can make these compensatory adjustments. For example, they can present detailed previews of upcoming selections, thereby giving students a rich store of higher level knowledge of the selection and easing the burden of processing.

The Concept of Automaticity

An automatic activity is an activity that can be performed instantaneously and without conscious attention. At least some of the subprocesses that are part of the overall process of reading must be automatic if the reader is to get any meaning out of what he or she is reading. As the interactive-compensatory model illustrates, there are a number of subprocesses that occur as one reads. The reader must simultaneously process information at the letter, word, phrase, sentence, and several other levels. This, however, creates a potential problem. The mind's capacity to process information is limited. We simply cannot attend to too many things at once. In fact, we can only really attend to one thing at a time. Getting meaning out of sentences and longer units of discourse requires attention. If the reader must attend to other subprocesses while reading, he or she will not be able to attend to meaning and consequently will not understand what he or she is reading.

Two closely related subprocesses must be automatic. One of these is recognizing words (Laberge & Samuels, 1974; Perfetti, 1976). Readers must automatically recognize the vast majority of words they encounter. They cannot afford any sort of mental process such as "Oh. Let's see. Yes, this word is intervention."

The other subprocess that must be automatic is that of assigning meaning to words. Readers must develop what Beck, Perfetti, and McKeown (1982) call "rapid lexical access" to words. This means that in addition to recognizing words automatically, they must automatically--instantly and without conscious attention--assign meanings to words. Many words, Beck and her colleagues claim, are known only at the "acquainted" level. In such a case, students know the word but have to think for a moment to recall its meaning. Ferocious might be such a word for many fourth graders. Some fourth graders could probably recognize the word in print, might even recognize it automatically, but then would need to go through a mental process such as, "Let's see. Ferocious? Oh, yes. That means fierce and mean." Readers cannot afford to go through such a process with very many of the words they encounter.

The major message of the concept of automaticity is that teachers need to be careful not to assign materials with large numbers of words that will cause students problems. Frequently, this means preteaching potentially troublesome words before students read a selection. Also, schools need systematic, long term programs to develop students' vocabularies--programs that will both aid students in becoming able to automatically recognize the words already in their oral vocabularies and aid them in learning and fully mastering new words.

## Teaching Effectiveness

Up until quite recently, years of research on teaching had produced few consistent and generalizable results about what constitutes effective teaching (Duffy, 1981; Gage, 1978). Over the past decade, however, research and reviews by Berliner (1981), Brophy (1982), Duffy (1981), Good (1979), Rosenshine (1977),

Stallings (1979) and a number of other investigators has begun to yield quite consistent findings about what constitutes effective instruction. These findings generally support an approach to instruction that has come to be called "direct instruction." Rosenshine (1977) has given the following succinct definition of direct instruction.

> Direct instruction refers to high levels of student engagement within teacher-directed classrooms using sequenced, structured materials. As developed below, direct instruction refers to teaching activities focused on academic matters where goals are clear to students; time allocated for instruction is sufficient and continuous; content coverage is extensive; student performance is monitored; questions are at a low cognitive level and produce many correct responses; and feedback to students is immediate and academically oriented. In direct instruction, the teacher controls instructional goals, chooses material appropriate for the student's ability level, and paces the instructional episode. Interaction is characterized as structured, but not authoritarian; rather, learning takes place in a convivial academic atmosphere. (p. 9a)

In defining direct instruction in his 1977 paper, Rosenshine noted that the concept was still being refined. And in a more recent paper, Berliner (1981) notes that although the concept is a very rich one, it is still not fully defined. To be sure, the concept is continuing to be developed. However, the results of the research conducted over the past five years have been remarkably consistent in showing the effectiveness of teaching that generally follows the principles of direct instruction. Moreover, although most of the data originally used to support the efficacy of direct instruction was gathered from studies of elementary children, more recent research has shown that such instruction can be effective with a variety of students. In a study of 47 remedial reading classrooms in eight school districts, Stallings (1979) found that direct instruction procedures produced significantly larger gains than other sorts of instruction for junior and senior high school students. And several recent studies have shown that a

direct instruction procedure for teaching prefixes was extremely effective with seventh and eighth grade students in a middle-class junior high school (Graves & Hammond, 1980), fourth and fifth grade students in a middle-class elementary school (Nicol, 1980), and adult refugees with various language backgrounds (Her, 1981).

Two notes of caution with respect to the principles of direct instruction need to be made. First, most of the research leading to these principles has been concerned with the teaching of basic skills to poorer performing students. I believe that many of the principles of direct instruction are applicable to teaching better performing students and higher level skills. Pearson and Camperell (1981) have recently expressed the same belief. And Beck and her associates (Beck, Perfetti, & McKeown, 1982; McKeown, Beck, Omanson, & Perfetti, 1982) substantiated part of this belief in a recent vocabulary study that used many of the principles of direct instruction in teaching some higher level skills in a really exciting manner. However, other principles of direct instruction are almost certainly not appropriate in teaching higher level skills or better performing students. For example, students should not always deal with questions at a low cognitive level. Virtually all students need to work with higher level questions at least some of the time. In support of this position, a recent meta-analysis of the research on teacher questioning indicated that "gains in achievement can be expected when higher cognitive questions assume a predominant role during classroom instruction" (Redfield & Rousseau, 1981, p. 237).

The other note of caution is prompted by the fact that the description of direct instruction given here is extremely brief and, hence, oversimplified. Things are not all that simple. For example, as Berliner (1981) has explained, older and generally more skilled students can tolerate being incorrect more frequently than can younger and less skilled ones. For those wanting more

information on direct instruction, a recent paper by Duffy (1981) gives a fairly detailed account of the research on teacher effectiveness, including findings on direct instruction, and suggests some of the questions and directions for future research.

Listed below are what I believe to be the major principles emerging from the teacher effectiveness literature.

1. Instruction needs to be clearly distinguished from practice. Practice involves asking students to do something they can already do. Instruction involves showing or telling students how to do something. Both instruction and practice have their place; however, it needs to be clearly understood that asking students to do something does not constitute teaching them to do it.
2. A crucial goal of any instructional program is to secure large amounts of academic engaged time. Academic engaged time is the time students spend purposefully pursuing academically relevant material with a high rate of success.
3. Teacher directed instruction, active teaching in which the teacher instructs a group of students, is one of the best methods of achieving academic engaged time. Students, particularly lower achieving students, do not work very well on their own.
4. Highly structured classrooms in which the teacher chooses the tasks to be undertaken, directs students in how to do those tasks, monitors their progress as they complete the tasks, and gives students frequent feedback on their performance promote academic engaged time and hence achievement.

5. The use of two sorts of routines further promote academic engaged time. Managerial routines--prescribed sequences of activities that students engage in some definite cycle--avoid wasted time. Instructional routines--general procedures for presenting instruction of various sorts--free teachers from constantly having to create activities and give teachers time to monitor students, give them feedback, and give them help when it is needed.
6. Students will learn best if they experience repeated success in the activities they are asked to do.
7. Teachers need to communicate to each student, with their actions as well as with words, their belief that each and every student can learn.
8. Teachers need to communicate to each student their belief that they can effectively help each and every student to learn.

In concluding this section of the paper, I want to highlight a principle which has already been stated but which deserves restatement. To do so, I will quote two recent formulations of the principle. One is by Good and Brophy (1978).

> Teachers sometimes act as if the students are expected to learn on their own with no help from them.... Such behavior represents a fundamental failure to appreciate the teacher's basic role. The teacher is in the classroom to instruct. (p. 88)

Pearson and Camperell (1981) put much the same thing this way.

> We finally seem to be getting the message that kids learn what they are taught and get to practice. (p. 50)

I also want to highlight a very candid statement about the responsibility of teacher education institutions in preparing teachers. The statement is by Brophy (1982).

> I believe that many elementary teachers have been sidetracked from what traditionally was, and in my view still should be, their primary role as instructor to their students. In this regard, I also believe that teacher education institutions should recognize these realities and return to their former emphasis on preparing teachers to instruct, rather than continuing to make student teachers feel guilty if they spend too much time trying to do so. (pp. 21-22)

I heartily agree with all three statements. I would also add that it is not just elementary teachers who are being sidetracked. I sincerely believe that many secondary teachers and university professors are similarly guilty of failing to instruct their students.

## Vocabulary Instruction

In this section I will consider the types of vocabulary that need to be taught, methods of selecting words to teach, and methods of teaching vocabulary. As will be shown, classifying vocabulary aids teachers in selecting vocabulary to teach and in determining which teaching techniques are appropriate for which words.

### Types of Vocabulary

Vocabulary can be usefully classified in terms of the learner's concept of the word or concept being taught. The system described below was originally prepared by Goodman (1970). More recently, I have modified Goodman's system and described it in considerable detail (Graves, in press). In its present form, the system identifies four types of vocabulary.

Type One Words -- words which are in the student's oral vocabulary but which he or she cannot read.

Type Two Words -- new meanings for words which are already in the student's reading vocabulary with one or more other meanings.

Type Three Words -- words which are in neither the student's oral vocabulary nor his or her reading vocabulary but for which he or she has an available concept or for which a concept can be easily identified.

Type Four Words -- words which are in neither the student's oral vocabulary nor his or her reading vocabulary and for which he or she does not have an available concept and for which a concept cannot be easily built.

Before methods of selecting each type of word are discussed, some general characteristics of the system should be noted. First, the order in which the types are listed generally parallels the difficulty of the teaching and learning task. Type One words are the easiest to teach, and Type Four are the most difficult to teach. The difficulty of teaching the other types of words lies between these extremes.

Second, because the system classifies words and concepts according to an individual's prior knowledge of these words and concepts, the system is relative rather than absolute. What is a Type One word for one student may be a Type Three word for another. This does not mean that most words will be differentially classified in a particular classroom. Rather, within reasonably homogeneous classes, where students are about the same age, come from similar backgrounds, and have had similar experiences, the relationship between the word or concept being taught and students' prior knowledge will be similar for most of the students. Of course, to the extent that a class is less homogeneous this will be less true.

The last general characteristic of the system is that the four categories are not mutually exclusive. In particular, a new meaning represented by a Type Two word can either represent an existing or easily available concept or a new concept which cannot be easily developed. Also, the distinction between Type Three and Type Four words is sometimes a very fine one.

I turn now to methods of selecting each sort of word to teach.

Selecting Words to Teach

As I just noted, Type One words are the easiest sort to teach. They are also the easiest type to select. In fact, almost no Type One words need to be selected and taught to average and above average students in the intermediate and secondary grades. Such students can already read virtually all of the words in their oral vocabularies, and they have developed word attack skills that enable them to decode most of the relatively few words which are in their oral vocabularies but which they do not recognize instantly in print.

However, Type One words do need to be taught to those less able students whose reading vocabularies are considerably smaller than their oral vocabularies and who have not acquired adequate decoding skills to be able to deal independently with Type One words. In Graves (1980; in press) I discuss a number of sources of Type One words. Here, I will briefly note two sources. For students who read primarily in a particular reading series, the glossaries in the primary grade texts of the series are a very good source of Type One words. These are the words the students will encounter most frequently in the series, and they are the ones the students must learn to respond to automatically. Specific words to teach can be selected by starting with the word lists in the earliest readers, testing students' ability to pronounce the words on those lists, and then teaching the words they cannot pronounce. Testing can consist merely of asking students to pronounce the

words. They already know the meaning of these words. Also, students' knowledge of words at any particular level can often be tested with a subset of the words used at that level. If students can identify a randomly selected set of 20 words taken from the 200 word vocabulary used in a particular first reader, it is a good bet that they will know most of the other 180 words, and further testing at that level is not necessary. If, on the other hand, they can identify only 15 of the 20 words, then they probably need to be tested on all the words to determine just which ones they need to be taught. After words at a lower level are mastered, the teacher can proceed by testing words at higher and higher levels, teaching the words not known at one level before going on to select those needing to be taught at the next.

For students who do not use a specific reading series, the Harris-Jacobson word list (1972) is an very good source of Type One words. This list is based on a count of words appearing in basal readers and other materials used in grades 1-6. It lists about 6,000 words by the grade level at which they are first widely used. There is a list of words first widely used at the preprimmer level, a list first widely used at the first grade level, and so on. Thus, specific words to be taught can be selected just as they would be from the glossaries of reading series. The teacher starts with the lowest level word lists, tests students' knowledge of these words, teaches words that need to be taught at that level, and then moves to the next highest level.

The first step in selecting Type Two words, words with multiple meanings, to teach is to recognize that there are two kinds of multiple meaning words. On the one hand, there are words that have more than one common meaning. It is frequently pointed out, for example, that the word <u>run</u> has a large variety of meanings. One can run a race, run to the store, run a store, or run the rapids.

What is not as frequently pointed out is the fact that a great many English words have multiple meanings. Luckily, not all of these words need to be taught. Rather, students need to learn that words have multiple meanings and that the particular meaning a word has is determined by the context in which it occurs. Thus, when words with multiple common meanings are taught, they are taught to illustrate the general principle that many words have multiple meanings. Words exemplifying this fact can be selected from students' reading material. However, picking multiple meaning words out of reading selections can be time consuming. A text titled The Living Word Vocabulary (Dale & O'Rourke, 1981) provides a more convenient source of multiple meaning words.

The Living Word Vocabulary is a word list which presents the results of vocabulary tests administered to students in grades 4, 6, 8, 10, 12, 13 and 16. In all, the tests included about 43,000 items testing about 30,000 words, with multiple meanings of many of the words being tested. Each item consisted of the word being tested in the stem and three alternatives, which were either single words or short phrases. Each item was administered to students at various grade levels until that grade level at which between 67% and 84% of the students tested knew the particular word-meaning combination, and the exact percentage of students at that grade level who correctly answered the items are listed in the text. The entries for pose, which was tested with four meanings, are shown below.

| Grade | Score | Word | Meaning |
|---|---|---|---|
| 04 | 80% | pose | to sit for an artist |
| 06 | 80% | pose | to pretend |
| 08 | 84% | pose | position |
| 12 | 78% | pose | to present |

Thus, the text indicates that 80% of the 4th graders tested know the word pose meaning "to sit for an artist," but that it was not until 6th grade that 80% of the students knew pose meaning "to pretend." Obviously, The Living Word Vocabulary is extremely useful for identifying multiple meaning words and for determining the grade levels at which students are likely to know or not know various meanings.

Earlier, I noted that there are two kinds of multiple meaning words. The second kind of multiple meaning word has one common meaning, usually the more frequent meaning, and then another restricted meaning that is unique to a specific subject area, usually a less frequent meaning. Legend is a good example of such a word. Most intermediate grade students know that a legend is an old story. And although these students will probably learn more about legends in the literature classes they take (for example, they are likely to learn that legends are often believed to be true), they probably learned this original, common meaning without formal instruction. However, even in the secondary grades, many students do not know that a legend is a key to an illustration or map. Most students will learn this

meaning of legend only if their teacher, probably their history or geography teacher, points it out. Moreover, knowing the more common meaning of legend is of little help in figuring out this restricted meaning.

There are not a large number of these words, but there are certainly enough of them that teachers should be concerned with identifying those that may hinder students' understanding. Unlike the other kind of multiple meaning words, words having a specialized meaning in a particular subject should probably be chosen exclusively by subject matter teachers and exclusively from subject matter reading materials. Selecting them is largely a matter of teachers' being aware of them as they prepare to teach particular selections.

Learning to deal with Type Three words, words which are in neither their oral vocabulary nor their reading vocabulary, but for which they have an available concept, is the largest word learning task intermediate and secondary students face. Thus selecting Type Three words to teach is a formidable task, and certainly not all the Type Three words students will encounter can be directly taught. But this certainly does not mean that none of them should be taught.

There are three steps teachers can take in selecting Type Three words to teach. The first is getting some idea of just which words students are likely to know. Some of our recent work (Graves & Gebhard, 1982) indicates that teachers vary a great deal in their knowledge of their students' vocabularies. The second is setting up criteria for selecting the words, and the third is actually selecting the words.

Dale and O'Rourke's The Living Word Vocabulary can be a tremendous aid in learning about what words students do and do not know. As noted, the text lists words, their meanings, the grade level at which between 67% and 84% of the students tested knew the word with a particular meaning, and the exact percentage of students at that grade level that knew the word. The text provides precisely the information of concern here. That is, it answers the question, "What percent of my students are likely to know the word with this meaning?"

Another source of information about what words students know is the students themselves. Teachers can identify the words in upcoming selections that they think will be difficult for students and build multiple-choice or matching tests to find out whether or not the words are difficult. Of course, constructing such tests is time consuming and certainly not something to be done for every selection. However, it need not be done for every selection. Several experiences of identifying words that they think will be difficult and then checking students' performance to see just what was difficult will sharpen teachers' general perceptions of which words do and do not cause students problems.

There will almost always be more difficult words than the teacher has time to teach. Thus, once potentially difficult vocabulary is identified, the next step is to determine what words are worth teaching. Four questions will be helpful here. The first question to ask is, "Is understanding the word important to understanding the selection in which it appears?" If the answer is "No," then other words would usually take precedence for teaching.

The second question is, "Are students likely to be able to assign the word a meaning using their context or structural analysis skills?" If the answer here is "Yes," then they probably ought to be allowed to do so.

Having students use their word attack skills when they can will both help them to cement these skills and reduce the number of words that need to be taught.

Another question to ask is, "Can this word be used to further students' context, structural analysis, or dictionary skills?" In other words, "Can the word be used to help students develop skills they can later use independently?" If the answer here is "Yes," then dealing with the word can serve two purposes. It can aid students in learning the word, and it can help them acquire a generative skill. Thus, for example, one might deliberately teach a word because it has a useful prefix that at least some students still need to master.

The final question I would suggest asking is, "How useful is this particular word outside of the selection being currently taught?" By and large, the answer to this question will depend on the word's frequency. The more frequent a word in the materials students will be dealing with in the future, the more useful it is for them to know it. Moreover, the more frequent the word, the greater the chances that students will retain it once it is taught.

Learning to deal with Type Four words, words which represent new and difficult concepts, is often considered to be the most important vocabulary learning task that intermediate and secondary grade students face. This may be true. Learning new words that represent new concepts is certainly an important part of schooling, but learning other types of vocabulary is also important. What is certain is that the concept of Type Four words is itself an important one. It is also a somewhat illusive one. As I noted earlier, the distinction between Type Three words and Type Four words is sometimes a

fine one. More specifically, words and the concepts they represent form a continuum in which some words very definitely represent familiar concepts and can be easily explained, others represent somewhat familiar concepts and can be fairly easily explained (at least if they do not have to be explained too fully), and still others represent distinctly new concepts and require a good deal of time and effort to explain (particularly if they need to be explained fully). The other reason that the concept of Type Four words is somewhat elusive is suggested by the parenthetical comments above. That is, the difficulty of teaching a word or concept is influenced by the depth or precision of meaning that needs to be developed. Fascism, for example, would represent a new and potentially difficult concept for most 6th graders. However, teaching students that fascism is "a type of dictatorship" is radically easier than teaching the full blown concept.

A word of caution is in order here. Neither the fact that Type Three and Four words represent a continuum of difficulty nor the fact that difficult concepts can sometimes be taught at a simple level should be taken to mean that Type Four words really are not very difficult to teach. While it may make sense to talk about taking 10-15 minutes to teach ten Type Three words before students read a selection in which they are used, it makes no sense to talk about teaching ten Type Four words in anything like this period of time. Teaching a single concept may take days, and attempting to teach new concepts as if they were merely new words will serve no useful function. Doing so will only confuse students.

Mores is an example of a difficult Type Four word, one that might be introduced in senior high classes. Mores is also a good example of a word which can be taught at various levels. The teacher could, for example,

define mores as "customs," in which case it would represent an available concept. Such a definition might serve some purposes, although these would be unambitious ones, merely allowing students to get through a piece of material which included the word. As defined by one authority, mores are certain sorts of customs--"customs that are regarded by general agreement as highly important and obligatory as evidenced by strong sentiments against deviation and by severe punishment for violation" (Williams, 1968, p. 205). Obviously, mores are not simply customs. Less obviously, the concept MORES is not at all fully defined by the above definition. Fully understanding a concept involves being able to identify specific instances and non-instances of the concept and distinguishing between the concept and other related concepts. Thus, one who understands the concept MORES should be able to answer such questions as "Is armed robbery against the mores of our society?" or "Are folkways the same as mores?" Knowing the definition of mores given above, even understanding it, does not prepare students to answer even the above two questions, let alone provide them with a fully formed concept of mores. Teaching the word mores is not really a matter of teaching a word; it is a matter of teaching a concept. And teaching a concept such as this is a difficult and time consuming task.

I will be very brief about selecting Type Four words to teach. There is only one source of Type Four words. This is the subject matter being taught. Those Type Four words that need to be fully developed are the major concepts of the subject matter. Type Four words that need to be less fully developed are those that are less central to the subject matter.

Teaching Vocabulary

Here I will discuss the critical attributes of instruction appropriate for each type of word and describe one method of teaching each sort of word in detail.

Type One Words. Probably the most important thing to remember about teaching Type One words is what not to teach. What does not need to be taught is the meaning of the words. By definition, students already know the meaning of these words. The basic task for the student is to associate what is unknown, the written word, to what is already known, the spoken word. To establish this association, the student needs to see the word at the same time that it is pronounced. The association will be strengthened if a multisensory approach is used. Thus, a typical procedure might include the student's hearing the word, seeing it, pronouncing it, and writing it. In this way, the student's auditory, visual, and kinesthetic senses would be involved. Finally, the student needs to rehearse the association, to practice it. This can be done both through direct rehearsal--studying the words, using them in various exercises, or playing word games--and through incidental rehearsal--repeatedly reading the words as one encounters them in texts. Note that students are likely to get a great deal of incidental rehearsal when they are learning very frequent words but very little incidental rehearsal with infrequent words. If teachers want students to get much rehearsal with infrequent words, they must provide direct rehearsal.

One further matter to consider with respect to teaching words which are already in students' oral vocabularies is how to group them for instruction. These words should be grouped to reflect similarities in letter-sound

correspondences rather than to reflect relationships among meanings (although this latter method of grouping is appropriate for teaching words that are not already in students' oral vocabularies). For example, students who have the word throat in their oral vocabularies but cannot recognize it in print will be aided in learning to read the word if teachers point out to them that the spelling of the vowel sound in throat is the same as it is in the words boat and coat, two words which they can already read. On the other hand, these students will not be aided in learning to read throat by teachers' pointing out that the words throat, mouth, and nose all refer to parts of the body. They already know the meaning of the word.

Here is an appropriate method of teaching Type One words.

1. Select a set of 5-15 words grouped according to letter-sound correspondences. About half of the words should be unknown. A typical set of words might be bread, spread, breakfast, measure, weather, head, lead, dead, heavy, and ready.
2. Give students a list of the words, and read the list to them as they follow along. Do this twice if that seems necessary.
3. Read the words in random order and ask students to check each word as it is read. If some students check the wrong word, immediately correct them by repeating the word and spelling it.
4. Have students take each word in turn, cover it, and write it. Put each word on the board and have students correct each word they spelled incorrectly.
5. Have students read through the list of words, either as a group or individually. If students read any words incorrectly, correct them by simply pronouncing the words.

6. On the day following initial teaching, have the students read through the list again, and again correct any errors.
7. Finally, insure that the students get a lot of practice with the words and develop automatic responses to them by frequently reading them in meaningful contexts, that is, in material students find interesting and enjoyable.

Cunningham (1982) has pointed out that student diads can be very effectively used in teaching Type One words. Identify a set of words such as that suggested above (bread, spread, breakfast, etc.). Type the words on 3x5 cards. Identify a pair of students who still need to master some of the words. Then tell the students to repeatedly work through the set of cards (reading through them, presenting them as flash cards to each other, etc.) until their responses to them are accurate and instantaneous.

A more detailed consideration of teaching Type One words can be found in Graves (1978).

Type Two Words. As I noted above, there are two sorts of Type Two words--words with a variety of common meanings and words with one common meaning and another restricted meaning. The aims of instruction are different with each of these sorts of words, and consequently the instruction appropriate for the two sorts differs.

To be more precise, the meanings of words with multiple common meanings do not need to be taught. Students know a variety of meanings for run, for example. What does need to be done is to sensitize students to the fact that many words have a variety of common meanings and that the meaning a certain occurrence of a word has is determined by the context in which it occurs. Students need to be alerted to this fact; they need to be told that many

words have multiple meanings. Then, they may need to complete exercises designed to reinforce this knowledge. One way of reinforcing students' knowledge that words have multiple meanings is to give them multiple meaning words and their definitions and have them write sentences illustrating the various meanings. A slightly different way to accomplish the same purpose is to give students pairs of sentences illustrating different meanings of words and have them define the meanings of the words in the various sentences using dictionaries. Note that this latter procedure familiarizes students with using the multiple meanings dictionaries provide, something they often need help with.

As noted, the instruction for the other sort of Type Two words is quite different. Students already recognize these words in print and can pronounce the word when shown the printed version of it. However, they need to be taught a meaning of the word that they have not previously known. The general strategy for teaching this sort of multiple meaning word is to relate the new meaning to the already known meaning, showing first the similarities and then the differences in meaning. Ryder (1978) has described a specific procedure for teaching multiple meaning words. The procedure requires the teacher to construct a paragraph, which he or she then reads through with the students as they follow along on an overhead or from dittoed copies of the paragraph. Generally, the first section of the paragraph defines the known meaning of the word and uses the word in a sentence with that meaning. The next section of the paragraph defines the new meaning of the word and uses the word in a sentence illustrating that meaning. The next section describes the similarities between the two meanings. And the last section describes the differences between the two meanings.

Here is an example of Ryder's procedure used to teach a new meaning of pose.

> You all know that the word pose means "to sit for a photographer" as in the sentence, "I always have to pose for pictures on my birthday." But the word pose can also mean "to present" as in the sentence, "He posed a solution to the problem." The similarity between the two meanings is that both include the idea of presenting. One presents himself to a photographer to get his picture taken and one presents a solution to a problem. The difference between the two meanings is that pose meaning "to sit for a photographer" has a very restricted meaning; one can pose only to get one's picture taken.

One note of caution is in order here. Some multiple meaning words just will not fit into this format, and when a word does not fit into the format, some other procedure will need to be used.

As with any new learning, students need some sort of rehearsal with newly learned word meanings if they are to retain them over time. One appropriate rehearsal procedure to use with multiple meaning words that have first been taught using Ryder's procedure is to have students write definitions showing the two meanings of the words a week or so after the meanings have been initially taught.

A more detailed consideration of teaching Type Two words can be found in Ryder (1978).

Type Three Words. Here the task is distinctly one of teaching meaning. Simply decoding the word, sounding it out, will be of little use because the word is not part of the students' oral vocabularies. The general procedure for teaching Type Three words is to embed them in rich contexts which

serve to define their meaning and to relate them to words and concepts students already know. We have found a procedure which we term the Context-Relationship procedure to be very successful in teaching Type Three words.

The steps in the procedure are as follows.

1. Write a short paragraph in which the word being taught is used three times. In the first sentence of the paragraph, simply use the word in a rich context. In the next sentence, add anything that will help clarify the meaning of the word in the first sentence. In the third sentence use the word again, noting that its meaning can be compared to that of another word the students already know. Finally, in the fourth sentence, make the comparison.
2. Write a multiple-choice question containing a definition of the word that is correct and two distractors that are distinctly wrong.
3. Give students a study guide which lists each word to be taught, presents the paragraph you constructed, and gives the multiple-choice question.
4. Pronounce the word. Read the prepared paragraph. Read the possible definitions. Have students check the best definition, and then give them the correct answer.

Two sample paragraphs and multiple-choice questions are shown below.

Thrive

You can keep plants alive if you only water them once in a while. But if you want them to thrive, you must water and feed them on a regular basis. Thrive has a more specific meaning than grow. The word thrive indicates that something is doing very well.

Thrive means

_____A. to grow slowly.

_____B. to stay alive.

_____C. to grow well.

Labyrinth

The halls of the hugh, old mansion formed a labyrinth. We kept getting lost and had trouble finding the right room. Labyrinth has the same meaning as maze. The word labyrinth is used to describe a complicated and bewildering path.

Labyrinth means

_____A. a large basement.

_____B. a confusing passageway.

_____C. a place for mixing metals.

As is the case with multiple-meaning words, if these words are worth teaching, they are probably worth at least one planned rehearsal. One sort of rehearsal, and a type that is brief but often sufficient, is to give students a multiple-choice test on the words and correct the test in class. This might be done a week or so after students have first learned the words.

Further consideration of teaching Type Three words is given in Palmer (1979).

Type Four Words. Considering the task of teaching Type Four words is very different from considering the task of teaching the other types of words. When one is teaching a Type Four word, he or she is teaching a concept, and there are probably nearly as many ways to teach concepts as there are concepts. Moreover, since concepts may differ radically from each other, ways of teaching concepts may also differ radically. Still, the elements of a widely applicable general procedure can be described, and a somewhat more specific procedure can be described and illustrated. The elements of the general procedure are (1) a definition of the concept, (2) examples of the concept, (3) non-examples of the concept (closely related concepts that are likely to be mistaken for the one being taught), and (4) an opporunity for students to work with the concept.

The steps in one specific procedure are shown below.

1. Define the concept. In many cases this can be done by first defining the class of things to which the concept belongs and then describing the attributes of the concept that make it a specific member of this class.
2. Give one or several examples of the concept. Examples may consist of explanations of the concept, scenarios that illustrate the concept, pictures illustrating the concept, objects illustrating the concept, or even objects that are the concept.
3. Give one or several non-examples of the concept. As with the examples, the non-examples may take a variety of forms. As noted above, the non-examples should be of concepts that might be mistaken for the concept being taught.

4. Have students distinguish between examples and non-examples of the concept.
5. Have students produce examples and non-examples of the concept.
6. Have students define the concept in their won words.

The first four steps of the procedure, the steps that are completed by the teacher, are illustrated for the word temerity below.

1. A definition. Temerity refers to a way of behaving. A person who displays temerity engages in foolish boldness that results from underrating the danger of his or her actions.
2. Two examples. A person who climbed Mount Everest wearing tennis shoes would be showing temerity. Or, a person who fought a tiger with his bare hands would be displaying temerity.
3. Two non-examples. A runner who finished a race despite a side ache would not be displaying temerity. Neither would a person who went out on an overcast day without an umbrella. In neither case is the danger sufficient to term the behavior temerity.
4. Some examples and non-examples. Driving a motorcycle on the freeway (non-example). Sky-diving without a safety chute (example). Eating too much (non-example). Betting one's life savings on a horse race (example).

This is, as I just noted, only one of many procedures that might be used to teach Type Four words. Further consideration of teaching Type Four words is given by Boettcher (1979). Also, Beck, McKeown, and McCaslin (1979) and Calfee (1981) give teaching procedures appropriate for both Type Three and Type Four words.

## Teaching Reading Comprehension

In the section of this module on teaching effectiveness, I noted that a number of observers have recently charged that teachers spend a good deal less time directly instructing students than they should. As the work of such researchers as Durkin (1978-1979) and Duffy and Roehler (1982) makes clear, this charge is particularly valid when leveled at reading comprehension instruction. Direct instruction in reading comprehension is not a frequent activity in our schools. Moreover, as recent reviews by Tierney and Cunninghamn (in press) and Vaughan (in press) indicate, up until very recently there has not been a lot of evidence indicating just what constitutes effective comprehension instruction. There still is not a lot of direct evidence on the topic. However, the research on teaching effectiveness and theoretical considerations about the reading process offer a number of suggestions for teaching comprehension. Moreover, several recent studies of specific instructional procedures show that comprehension can be taught.

Here I will consider two sorts of comprehension instruction. The first of these is instruction designed to assist students in dealing with specific texts. Such instruction takes place immediately before, during, and after students are reading a particular selection. It aids students in what Tierney and Cunningham (in press) refer to as "learning from text." The other sort of instruction is designed to assist students in dealing with the variety of texts that they will encounter in their future reading. This instruction is likely to be coupled with a particular reading selection when it is presented, but the fact that it helps students deal with that selection is incidental; it is designed to help students deal with future texts. It aids students in what Tierney and Cunningham call "learning to learn from text" or what have sometimes been called "generative comprehension skills." I will consider each sort of comprehension instruction in turn.

Improving Comprehension at Specific Texts

One reason for wanting to improve students' comprehension of specific texts is obvious. We want students to understand what they read. There are two other reasons for wanting to improve students' comprehension of each and every selection they read that are perhaps not so obvious. They are, however, tremendously important. One is that we want each and every reading experience a student has to be a successful one. This, as I noted in the section on teaching effectiveness, is a key factor promoting learning. Moreover, as Berliner (1981) has pointed out, success is most crucial for those students who typically do not achieve well in school. Thus, success is particularly crucial for a number of mainstreamed students.

The other less than obvious reason that we want to improve students' comprehension of each and every text they read, to help them deal competently with each selection they read, is that each successful reading students do will contribute to their developing automaticity and becoming fluent readers. I noted the importance of automaticity in the section on theory. Students must learn to automatically recognize words and automatically assign them meanings if they are to become competent readers. As Beck (1981) has pointed out, there are two general strategies for promoting automaticity. One of these is to have students repeatedly read the same passages, practicing them as one might practice playing tunes on a piano. This method can be quite effective. It has been clearly described by Samuels (1979), and some classroom teachers may find it useful. However, it would more frequently be used by reading teachers than by classroom teachers. The other method of promoting automaticity is to have students repeatedly read material that they can deal competently with and that they generally find easy and enjoyable.

The following plan is designed to facilitate students' comprehension of specific selections and in so doing provide students with reading experiences that will be successful and enjoyable. The plan is a modified version of one several colleagues and I developed several years ago (Graves, Palmer, & Furniss, 1976). It is also, however, a modified version of the Directed Reading Lesson (see Harris & Sipay, 1980), and as such it is a plan which has been widely recommended by reading educators for decades.

A number of guiding principles underlie the plan. The first is that the classroom teacher's responsibility is frequently that of accommodating to students with varying reading ability and facilitating students' growth in reading rather than that of directly teaching reading.

The second guiding principle comes from the work of Herber (1978). According to Herber, an important task of schooling is that of gradually leading students from dependence on teachers to independence. Certainly, Herber acknowledges, the ultimate goal of schooling is to produce independent learners, in the specific case of reading, independent readers. But too often, he claims, teaching is assumptive; students are expected to accomplish new learning tasks without being taught how to do them. This, of course, is not teaching at all.

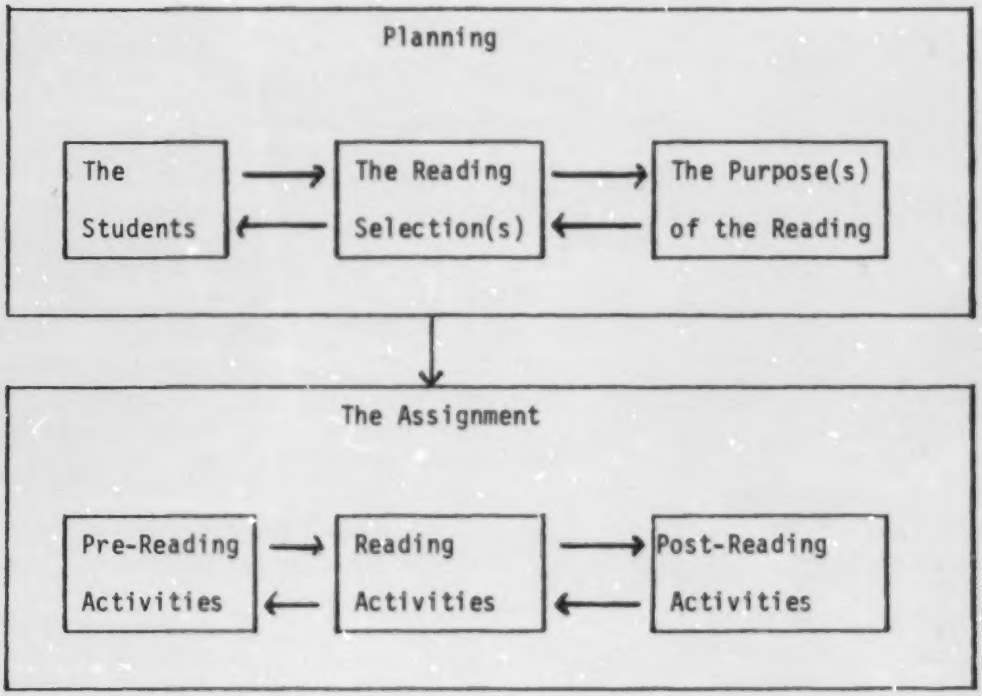
The third guiding principle comes from the work of Carroll (1963) and Bloom (1968). Carroll has put forth a notion of ability quite different from that traditionally held. Briefly, Carroll defines ability as the rate at which one learns rather than as a determinant of whether or not one can learn. And Bloom, in his work on mastery learning, endorses this concept of ability and argues that the vast majority of students can learn the vast majority of things we wish to teach them--but at radically different rates. Ability, I would add here, will vary markedly within most classes.

The fourth guiding principle is that Jenkins' (1979) model of the learning situation accurately describes the factors that one needs to consider in constructing a reading assignment. According to Jenkins, the relevant factors are the characteristics of the learner, the nature of the materials, the criterial tasks, and the learning activities.

The fifth guiding principle is that prereading activities, activities that teachers engage students in immediately before they read a selection, are particularly important to comprehension and deserve a good deal of the teacher's and the students' time and effort. This principle is particularly consistent with the work of Beck and her colleagues (Beck, 1981, 1982; Beck & McKeown, 1981; Beck, McKeown, McCaslin, & Burkes, 1979; Beck, Omanson & McKeown, 1982) and with some of our own work (Graves & Cooke, 1981; in press; Graves & Palmer, 1981).

The final guiding principle is really a set of principles. Specifically, it is that the instruction should be consistent with the results of the teaching effectiveness research (Berliner, 1981; Brophy, 1982; Duffy, 1981; Rosenshine, 1977). In particular, the plan relies heavily on the notions that instruction should frequently be teacher directed and that success is crucial to learning.

With those principles in mind, the plan can be briefly outlined. The figure below illustrates both the factors considered in planning and the major components of an assignment.




Planning takes into account the students, the reading selection, and the purpose of reading. These factors are interrelated, and decisions made about any one factor constrain the decisions that can be made about the other two. If, for example, the decision is made that a certain selection must be dealt with, the purposes of the assignment are limited to those to which the selection lends itself, and only certain students may be capable of reading the selection. If, on the other hand, the decision is made that the assignment is to have the students read for enjoyment, and assuming that different students enjoy different things, then multiple selections will have to be used.

The result of planning is the creation of the activities themselves. As shown in the figure, the possible components of the assignment are pre-reading activities, reading activities, and post-reading activities. As is the case with the three factors considered in planning, the three components of the assignment are interdependent. If, for example, the decision is made that all students are to read a particular selection for homework and if the selection is relatively difficult, then at least some students are likely to need a good deal of pre-reading instruction. If, on the other hand, the decision is made that students are to read a relatively simple selection solely for enjoyment and that there is to be no post-reading task, then pre-reading activities may not be needed.

In the remainder of this section of the module, I discuss the pre-reading, reading, and post-reading activities that can be used. It is important to note that I am not suggesting that all of these activities ought to be a part of all reading assignments for all students. In a heterogeneously grouped classroom, activities should be differentially assigned. Generally, more pre-reading activities and simpler post-reading tasks will need to be employed when a reading selection is difficult for a student or group of students. Then, too, the reading selections themselves need to be differentially assigned. Both better and poorer readers should deal with selections with which they need no help and others with which they need a good deal of help. The goal is to accommodate to students' reading abilities and facilitate their success in reading while gradually leading them from dependence on the teacher to independence.

Pre-reading Activities. The pre-reading activities considered here are motivating students, building or activating students' background knowledge, previewing, preteaching vocabulary, and prequestioning and direction setting.

There is little need to present a general rationale for the importance of momotivation. Psychologists have recognized the importance of motivation in learning

at least since the time of Edward Thorndike. And teachers have always recognized the importance of motivating their students. Moreover, many of the activities discussed below are concerned in one way or another with motivating students. Here, however, I am referring to motivational activities of a particular sort, and I want to make a specific point about the value of such activities. As defined here, motivational activities are activities which are undertaken prior to reading and are intended solely for the purpose of getting students interested in the upcoming reading. These activities do not necessarily bear a close relationship to the content of the reading selection and need not serve as overviews of the selection. The point I wish to make about motivational activities of this sort is this: Sometimes, and perhaps frequently, doing something solely for the sake of motivating students is well worthwhile.

The importance of building or activating students' background knowledge is the central teaching implication growing out of schema theory. As I noted above, schema theory lays incredible stress on readers having and accessing appropriate schemata for anything they attempt to read. Adams and Bruce (1982) elaborate on this notion.

> To say that background knowledge is often used, or is useful in comprehending a story is misleading. It suggests that a reader has the option of drawing on background knowledge to enhance the comprehension process, but that she/he might just as well do without such frills--as if there were a reading process separate from the drawing-on-background-knowledge process.
>
> In fact, reading comprehension involves the construction of ideas out of preexisting concepts. A more correct statement of the role of background knowledge would be that comprehension is the use of prior knowledge to create new knowledge. Without prior knowledge, a complex object, such as a text, is not just difficult to interpret; strictly speaking, it is meaningless. (pp. 22-23)

Adams and Bruce (1982), Beck (1982), and Beck, McKeown, McCaslin, and Burkes (1979) present excellent discussions of the sorts of background information children need to have and use if they are to understand what they read.

Previewing differs from building or activating students' background knowledge in that previews provide students with specific information about the contents of a selection rather than dealing with background for the selection. The use of previews is strongly supported by the notion that reading is an interactive process that makes use of information from a variety of sources and that deficits in knowledge of one sort may be compensated for by knowledge of other sorts. Briefly, previews provide students with a good deal of knowledge about a selection before they read it, making the reading process itself less difficult. Previews for short stories, for example, provide information about the setting, characters, plots, and structures of stories. My colleagues and I (Graves & Cooke, 1980, in press; Graves & Palmer, 1981) have conducted several studies investigating the effect of previews with short stories, and have found that previews consistently improve comprehension and that students like having stories previewed. The previews we have used are quite detailed, ranging from 400 to 600 words for stories ranging from 1,500 to 6,000 words. The previews are read to students immediately before they read the stories. Graves and Cooke (in press) contains a detailed description of previewing and a sample preview.

Preteaching potentially difficult vocabulary from a selection to be read is a standard practice for teachers and is recommended by reading authorities (Harris & Sipay, 1980; Herber, 1978). Moreover, recent research indicates that teaching vocabulary can improve students' comprehension of a selection (Beck, Perfetti, & McKeown, 1982; Graves & Bender, 1980; McKeown, Beck, Omanson & Perfetti, in press). The central theoretical justification for preteaching vocabulary stems from the notion that the mind is a limited capacity processor and that both recognizing words and assigning them meanings must be automatic

processes to avoid overburdening the mind's limited capacity. The vocabulary section of this paper, particularly the section on Type Three words, contains useful information on ways of selecting and teaching vocabulary from upcoming selections.

Prequestioning and setting the direction for reading are other activities that are primarily motivated by the notion that the mind is a limited capacity processor. If students read selections without some idea of what they are reading for, what questions they should be trying to answer as they are reading, they are in a sense forced to attempt to attend to everything, and in so doing they are likely to overburden the mind's limited capacity to process information. Asking students questions or giving them directions for reading focuses their attention and can thus make the reading task a manageable one. At the same time, one needs to recognize that there is a danger in focusing attention. If attention is focused too narrowly by questions or directions the teacher gives, students may fail to attend to other important aspects of what they are reading. Thus, teachers need to be careful in formulating prequestions. If a selection is difficult for students and one specific prequestion is all that they are likely to be able to answer, asking a single specific prequestion is appropriate. If a selection is not particularly difficult for students, prequestions should be broad enough and sufficiently numerous that the students will attend to and learn from much of the selection. Of course, the same reasoning applies to setting directions. Beck, McKeown, McCaslin, and Burkes (1979) provide a thorough consideration of setting directions for reading.

Reading Activities. The reading activities considered here are guided reading, alternate readings, modified readings, and listening.

Guided reading refers to a procedure in which questions are inserted into a selection in such a way that readers are directed to stop and consider a question or several questions one or more times while they are reading. Frase (1968) and Rothkopf and Bisbicos (1967) have investigated various placement locations for questions inserted in a text and have found that interspersing questions within a selection can enhance learning. Like prequestions, questions inserted into the text serve to focus attention. The advantage of inserting questions at several points rather than placing all of them before the selection is that the reader need not remember as many questions and hence look for as many answers at any one time. Some of our own work (Graves & Clark, 1981) has indicated that inserted questions can be quite effective with less able students.

Providing individual students or groups of students with alternate readings is certainly one of the best ways of insuring that each student will be successful. Particularly with poorer readers, providing students with something they can do as opposed to something they cannot is crucial (Berliner, 1981). Alternate readings are thus appropriate when no method of structuring a reading assignment can make it appropriate for all students. And alternate readings are sometimes appropriate even when some sort of structure could make a single selection appropriate for all students. As noted previously, the ultimate goal of reading instruction is independence in reading; if students are to become independent readers, they must get practice in reading without the teacher's guidance. Providing students with reading which is relatively easy for them is also one of the principal means for promoting automaticity and fluency (Beck, 1981).

When appropriate alternate readings are unavailable or when it is not desirable to have students read different selections, readings can sometimes be modified. The most feasible possibility here is to have less able students read only parts of a selection. As previously noted, ability can be usefully thought of as the rate at which one learns (Bloom, 1968; Carroll, 1963). It therefore makes good sense to have less able readers read and learn less in a given amount of time than more able readers. Note also that asking students to read part of a selection rather than all of it when part of it is all they are able to read will lead to success rather than failure.

Particularly for poorer readers, listening is a distinctly easier task than reading. "By age four," writes one linguist, "[the child] will have mastered very nearly the entire complex and abstract structure of the English language" (McNeill, 1966, p. 21). While this statement about young children's linguistic development is exaggerated, the fact is that every normal child learns to speak and listen relatively well before entering school (Gibson & Levin, 1975). Certainly, some children are better listeners than others; and, in fact, schools probably do not generally develop students' listening abilities to their fullest extent (Laundry, 1969). Nevertheless, there are not remedial listeners in the same sense that there are remedial readers. Tentative evidence suggests that for average students reading becomes a more effective channel than listening at about the seventh grade level (Sticht, Beck, Hauke, Kleiman, & James, 1974). Thus, for students reading below this level, listening represents a viable alternative to reading.

Post-reading Activities. The postreading activities considered here are post-questioning, discussing, writing, and dramatizing.

Questioning is, of course, one of the most frequent post-reading activities teachers engage in, and in fact whole books have been written on the

topic of teachers' questions (see, for example, Sanders, 1966). Here, four aspects of questioning will be considered. The first is the nature of the questions themselves. Taxonomies such as those of Barrett (1976) and Pearson and Johnson (1978) suggest the types of questions that can be asked. Barrett and Clymer, for example, list literal comprehension, reorganization, inferential comprehension, and appreciation. A second aspect of questioning to consider is the importance of the questions to students understanding the reading. Beck, McKeown, McCaslin, and Burkes (1979) have argued that teachers need to be certain students understand the basics of a reading selection before they are asked questions about more tangential matters. A third aspect of questioning to consider is the number of questions asked. As previously noted, less able students learn at a slower rate than more able ones (Bloom, 1968; Carroll, 1963). It therefore makes good sense to ask poorer readers fewer questions than better readers. The fourth aspect of questioning to consider is the availability of the answers. Students can be required to recall answers without using the text, or they can be allowed to return to the selection for answers. When students are allowed to return to the selection, they can be still further aided by being provided with the page, paragraph, or even line on which the answer occurs (Herber, 1978).

While questions are frequently dealt with by students individually, discussions, of course, involve two or more students. Having students work together offers several potential advantages over having them work separately. Particularly for the poorer readers, those who may have read a selection without fully understanding it, discussion in a heterogeneous small group offers a convenient and relatively non-threatening setting in which the information not gained through reading can be acquired (Herber, 1978). For all students,

discussion provides an opportunity for exchange and collaboration that may lead to higher order thinking and use of language (Moffett, 1968). Finally, particularly with small groups, discussion affords students an opportunity to deal with the parts or interpretations of a selection that particularly interest them.

Everything else being equal, writing is a more difficult task than having a discussion or answering objective questions. For this reason, special care needs to be taken in giving writing assignments, particularly to less able students. At the same time, students' use of any language activity serves to reinforce their skill at others (Moffett, 1968), and integration of these various activities is a much sought after goal (Aulls, 1975). Thus, students should at least sometimes be asked to write after they read a selection. Extended consideration of writing activities is beyond the scope of this module. However, two guidelines for keeping writing tasks relatively simple can be gfiven. Writing assignments for less able students should be kept short, and instructions on what and how to write should be quite specific.

Included among dramatic activities are a range of performances extending from elaborate, theoretical, scripted presentations to very informal creative and improvisational dramatizations. For the most part, our concern here is with the less formal activities. These activities lend themselves very readily to affective goals such as engagement and involvement with a selection. They also provide opportunities for various sorts of cognitive growth (Koziol, 1973), and teachers need feel no need to apologize for such activities as being merely fun and games. Two notes about the difficulty of dramatic activities deserve attention. First, dramatic activities that rely heavily on full understanding of the text will prove more difficult for poor readers than those that rely more on personal experience. Second, students must not be threatened by the

task. The best safeguard here is to move into drama slowly, being sure that all points that students are thoroughly comfortable with any sort of dramatization they are asked to perform before other students (Courtney, 1981; Way, 1965).

In concluding this section of the paper on improving comprehension of specific texts, several general comments about the plan presented should be made.

The various sorts of pre-reading, reading, and post-reading activities discussed above are, of course, only some of the procedures that can be used with reading assignments. The list is in no way meant to be restrictive. Teachers certainly should and do use others. Moreover, the real world of teaching is more complex than the classification scheme may make it appear. Dramatic activities, for example, can frequently be used prior to reading a selection rather than following one. They could, as Koziol (1982) has pointed out, be particularly useful in helping students to engage appropriate schemata for an upcoming selection. Nevertheless, the scheme illustrates many of the activities that can be used to accommodate to students of varying abilities, and I believe it provides a reasonable framework for teachers who find themselves teaching classes of students with diverse abilities, a situation which most teachers face.

## Teaching Generative Comprehension Skills

As I noted in the introduction to this section of the paper, there is not a great deal of evidence indicating just what constitutes effective comprehension instruction. This is particularly true with respect to teaching generative comprehension skills. Nevertheless, there are certainly some approaches to fostering generative comprehension skills that are supported by common sense, logic, and at least some research findings. In the remainder of this section of the module and with the aid of a set of articles reprinted in the back of

the module, I consider six approaches. These are choosing appropriate reading materials, asking a variety of types of questions, teaching text structure, teaching a generalized study strategy, and fostering metacognitive behavior.

Choosing Appropriate Reading Materials. In the last section of this module, I discussed methods teachers can use to facilitate students' comprehension of specific selections. I did not, however, emphasize what is probably the single most effective way of insuring that students comprehend what they read. Almost certainly, the most effective method of insuring that students understand what they read is to give them appropriate materials to read, materials that they can read fluently--with interest, enjoyment, and understanding. Moreover, the kind of successful reading experiences that reading appropriate materials create will lead to long term growth in reading skills (Beck, 1981).

The most commonly used method of attempting to determine the appropriateness of reading selections is to use readability formulas to assess the difficulty of the selections. Readability formulas are objective methods of assessing the ease or difficulty of selections. Readability formulas almost always yield grade level designations for material; that is, they indicate that the material can be read by students who are reading at at least such and such a grade level. The formulas usually arrive at a grade level designation by taking into account two attributes of the material--some measure of word difficulty and some measure of syntactic complexity. It is important to note that these indices are considered to be correlates of reading difficulty. Difficult texts frequently contain difficult vocabulary and difficult syntax, and easy texts frequently contain easy vocabulary and syntax. However, vocabulary and syntax are by no means the only factors influencing reading difficulty, and text that contains easy vocabulary and easy syntax is not necessarily easy. Moreover,

it is not always possible to simplify a difficult text merely by simplifying vocabulary and syntax.

All of this means that readability formulas are not always accurate; they are not very precise; and they do not provide anything like a set of guidelines on how to write readable material or how to simplify difficult material. Despite these limitations, I believe that readability formulas are useful and should be used. They are useful in preventing gross mismatches in which the material presented to a student is simply too difficult for him or her. If a readability formula indicates that a selection is a grade or so above a student's reading level, this may not mean much. However, if a formula indicates that a selection is two or more grades above a student's reading level, then the selection may very well be too difficult for the student. In such cases, teachers should at least consider using another selection.

The Fry Readability Formula and a recent discussion of the formula by Edward Fry are presented in the Appendix. Fry's formula is one of the most widely used formulas, and one of the easiest formulas to use. In my judgment, it is as appropriate as any formula for the sort of use suggested here.

There are, as I just said, a number of factors other than those considered by readability formula that influence the difficulty of material. Many of these factors have recently been discussed by Spiro and Taylor (in press). Several of them are briefly discussed below.

Certainly the most important factor to consider about any selection is its content. Is the content intrinsically easy or intrinsically difficult? Is the topic one that students are familiar with? Do students have sufficient background knowledge to deal with the topic? Is the topic likely to be interesting and enjoyable for the students?

A second important factor to consider is the structure of the selection. Is the material well organized? Does the selection deal with relatively few main topics and present a lot of supporting information, or does it deal with a host of different topics, too many for students to remember? Is the selection coherent? Are the ideas in the selection related to each other in a clear and logical fashion? Are students familiar with the structure of the selection? Does it use a form of organization that students have previously worked with?

The last factor I will mention applies particularly to textbooks. It concerns the learning aids provided in the text. Do chapters have clear introductions that let students know just what is going to be presented? Do the authors make informative use of headings? Are photographs, charts, and graphs effectively used to support the text? Do chapters have succinct summaries? Do they have any sort of check up tests for the readers?

Of necessity, the consideration of choosing appropriate materials here has been quite brief and hence incomplete. The Spiro and Taylor (in press) paper presents additional useful information. Also, Armbruster and Anderson (1981) present an interesting examination of the topic. Additionally, an article on choosing social studies materials by Charles Peters is included in the Appendix. Peters' suggestions are applicable to choosing materials of a variety of sorts. Finally, in a quite different vein, Cunningham (1982) has argued that teachers should actually try out materials on students to determine their appropriateness. Certainly, trying out materials is at least sometimes possible and can provide valuable insights.

Asking a Variety of Types of Questions. As I pointed out in the section of this module on teaching effectiveness and as has been repeatedly stressed in the literature (Duffy & Roehler, 1982; Durkin, 1978-1979; Herber & Nelson, 1975), asking students questions ought not to be confused with teaching them how to answer those questions. At the same time, common sense, correlational evidence from the research on teaching effectiveness, and at least some experimental evidence (Hansen, 1981) suggest that students are going to be better able to answer types of questions they frequently encounter than types of questions they rarely or never work with. It therefore makes good sense for teachers to deliberately and rather systematically ask students a variety of types of questions. Considered below are two guides for asking different sorts of questions.

The first guide is Pearson and Johnson's (1978) three level taxonomy of questions. The first level is termed textually explicit. The answers to textually explicit questions come directly from the text. These are what most people would call strictly factual questions. The second level is termed textually implicit. The answers to textually implicit questions also come primarily from the text, but they are not as directly stated in the text as are the answers to textually explicit questions. Answering textually implicit questions requires at least some inferencing. In more traditional terminology, some of these questions would be termed factual, and others would be termed inferential. The third level is termed scriptually implicit. Here, the word script refers to what I referred to as a schema in the section of the module on theoretical considerations. The answers to scriptually implicit questions require that readers use both information from the text and their background knowledge or schemata. Pearson and Johnson present the following paragraph and sample questions to illustrate the three levels of questions.

Will Wends His Way

Right after the Civil War, many distraught soldiers made their way West to find fame and fortune. Some could not go home because there were no homes to go to. The war had devastated them. One young man, Will Goodlad, made his fortune in the hills of Colorado. He found gold in a little river near Grand Junction. His fortune was short-lived, however. In 1875, he declared bankruptcy and returned to the land of his birth--the Piedmond of South Carolina.

(1) When did Will declare bankruptcy? (textually explicit)

(2) Where was Will born? (textually implicit)

(3) For what side did Will fight during the War? (scriptually implicit)

Most readers would probably agree that question 1 is textually explicit and question 3 is scriptually implicit. However, I suspect that some readers would argue that question 2 is also a textually explicit question. Pearson and Johnson acknowledge the similarity of textually explicit and textually implicit questions, but argue that the answers to textually implicit questions are not as "directly, explicitly, and precisely taken from the text" (P. 159) as the answers to the former. They further argue that teachers need to be aware of situations in which students are making even small inferences.

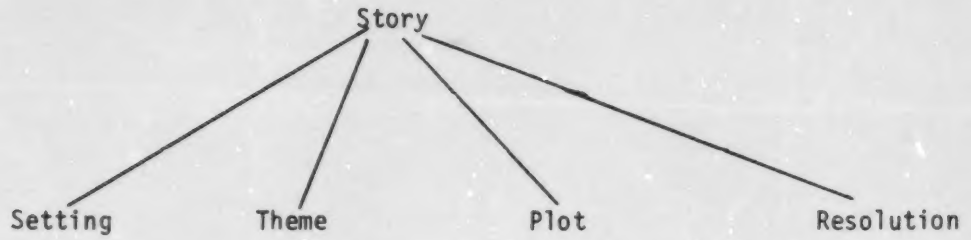
The second guide to asking different sorts of questions is Barrett's (1976) taxonomy. As I noted in the section of this module on facilitating comprehension of specific texts, Barrett's taxonomy has five major levels: literal comprehension, reorganization, inferential comprehension, evaluation, and appreciation. Each of these major levels is further broken down into more specific categories. For example, under evaluation, Barrett includes judgments of reality or fantasy, judgments of fact or opinion, judgments of adequacy and validity, judgments of appropriateness, and judgments of worth, desirability, and acceptability. The complete taxonomy is presented in the Appendix. I have

found the level of specificity it provides very useful in leading me to ask different sorts of questions.

In addition to asking different sorts of questions as identified by a taxonomic guide, teachers need to ask the right questions for the particular selection students are reading. They need to ask those questions that are important for students' understanding of the story. A paper by Isabel Beck and Margaret McKeown discussing the importance of these questions and how they can be identified is included in the Appendix.

Teaching Text Structure. This section of the paper differs from most others in that it provides only a very brief introduction to a topic rather than providing a fairly thorough treatment of the topic. This is so because the topic, teaching text structure, is a very complex one and one that is only beginning to be dealt with in the literature. Nevertheless, the topic is at least worth considering.

Recent work by educators (Meyer, 1975), linguists (de Beaugrande, 1980), and psychologists (Thorndyke, 1977) has identified the canonical structures of various forms of narration and exposition. Meyer and her colleagues (Meyer, 1975; Meyer, Brandt, & Bluth, 1980), for example, have identified and studied four expository structures that are quite frequently used. These are antecedent-consequence, problem-solution, favored position-opposing position, and simple listing. Somewhat similarly, Cunningham and Foster (1978) noted that the elements shown in the diagram below could be used to explain the structure of simple narratives.




| Setting | Theme | Plot | Resolution |
|---|---|---|---|
| A. 1. Location<br>2. Time<br>3. Characters | A. Main goal of the main character | A. 1. Subgoal<br>2. Attempt to accomplish subgoal<br>3. Outcome of attempt | A. Does the main character accomplish his/her goal? Explain. |
| B. 1.<br>2.<br>3. | | B. 1.<br>2.<br>3. | |
| C. 1.<br>2.<br>3. | | C. 1.<br>2.<br>3. | |
| D. etc. | | D. etc. | |

Recent research has indicated that better comprehenders are familiar with the structure of stories (Dreher & Singer, 1980) and exposition (Meyer, Brandt, & Bluth, 1980). Research has further indicated that students who recall more of what they read use the author's structure in organizing their recall (Meyer, Brandt, & Bluth, 1980; Slater, Graves, & Palmer, 1982). Experts (Beck, 1982; Calfee, 1981) have recommended teaching text structure. And at least some recent research has shown increased comprehension and recall as a result of teaching both narrative (Tackett, 1982) and expository (Slater, 1982) structure.

Teaching text structure is therefore at least worth considering. A paper on teaching narrative structure by Cunningham and Foster (1978) is included in the Appendix, and Slater (1982) provides some useful suggestions for teaching expository structure.

Teaching a Generalized Study Strategy. As I noted in the section of this module on improving comprehension of specific selections, the ultimate goal of schooling is to make students independent learners. If students are to become independent in learning from what they read, they need to learn some sort of general strategy for studying text.

SQ3R (Robinson, 1941) is by far the best known study strategy. SQ3R stands for Survey, Question, Read, Recite, and Review. Each of these steps is briefly discussed below.

The first step is to survey. This means to go through the material rather quickly to get a general idea of what is there. Read the title of the selection. Next, read the introduction, usually the first paragraph or several paragraphs of the selection. Then, read any bold faced headings there are. If there are no bold faced headings, read the first sentence of each paragraph. In fact, it is a good idea to read the first sentence of each paragraph even if there are headings. Finally, read the conclusion, usually the last paragraph.

The second step is to question. Actually, this is part of the first step because readers should start posing questions as soon as they start surveying the material. The idea is to ask the questions that should be answered during reading. Make the questions as specific as possible, and jot them down on a piece of paper. Leave spaces between them for the answers.

The third step is to read. Readers who have surveyed and questioned have a general idea of what is in the material and the questions that are likely to be answered. Read with a purpose; jot down answers to the questions that were asked. Also, jot down important information that was not questioned.

The fourth step is to recite. This should be done immediately after reading the material. There are several ways to recite. Readers can recite to themselves or to others; and they can recite mentally, aloud, or in writing. In any case, one should recite without looking back at the text or the answers to the questions posed if at all possible.

The final step is to review. To review, briefly read through the notes taken on the selection and then try to recite the information without the notes. The first review should come fairly shortly after reading, before the newly learned material is forgotten. Subsequent reviews should be undertaken periodically after the first one so that the new learning is firmly fixed in long term memory.

Rather obviously, using SQ3R is time consuming and a lot of work. Getting students to use it is not easy. In fact, getting university professors to use it is not easy. Nevertheless, the sort of active search for meaning and deliberate attempts to remember that it fosters are crucial to effectively learning from text. Serious students definitely need to adopt some sort of definite strategy for studying. There are, of course, alternatives to SQ3R. Joseph Vaughan has recently suggested one he calls the ConStruct procedure. His paper describing the ConStruct procedure is included in the Appendix. Also recommended is a recent review of study strategies by Anderson and Armbruster (in press).

Fostering Metacognitive Behavior. As used here, the term metacognition refers to the reader's awareness of his or her comprehension of a text and also to the reader's regulation of the processes that lead to comprehension. Although psychologists have been aware of the importance of metacognitive processes at least since the time of Binet (1909), the term itself is relatively new, and there has recently been renewed interest in the topic. Much of the recent work on metacognition has been done by Brown and her colleagues (Brown, 1978, 1980, 1982), and a paper by Brown, Campione, and Day summarizing much of Brown's thinking is included in the Appendix. Because that paper is quite complete, the treatment here will be quite brief.

The argument motivating the study of metacognition is that active awareness of one's comprehension while reading and the ability to use effective fix-up strategies when comprehension breaks down are absolutely essential to effectively learning from reading. Moreover, it is argued that good readers exhibit metacognitive behavior while poor readers do not.

Brown (1982) has discovered two particularly well phrased characterizations of the situation. The characterization of good readers comes from a book on intelligence by Whimbey (1975).

> A good reader proceeds smoothly and quickly as long as his understanding of the material is complete. But as soon as he senses that he has missed an idea, that the track has been lost, he brings smooth progress to a grinding halt. Advancing more slowly, he seeks clarification in the subsequent material, examining it for the light it can throw on the earlier trouble spot. If still dissatisfied with his grasp, he returns to the point where the difficulty began and rereads the section more carefully. He probes and analyzes phrases and sentences for their exact meaning; he tries to visualize abstruse descriptions; and through a series of approximations, deductions, and corrections he translates scientific and technical terms into concrete examples. (p. 91)

The characterization of the poor learner comes from a much earlier book by Binet (1909).

> The child is unreflective and inconstant; he forgets what he is doing...he lets himself be carried away by fantasy and caprice...he lacks direction...He does not know what he does not know. The why with which his curiosity hounds us is embarrassing, for he will be contented naively with the most absurd becauses. (pp. 119-120, 122)

The question, of course, is what teachers can do to foster metacognitive behavior in children. There is certainly no final answer to this question available at the present time, and there is never likely to be an easy answer to it. Nevertheless, some recommendations can be made.

The first recommendation is that teachers themselves need to become aware of the importance of metacognitive behavior, that they need to realize that it is important for students to monitor their comprehension and to undertake appropriate strategies when comprehension fails. The second recommendation is that students be told about the importance of metacognitive behavior. Of course, just telling them is not enough. Students need to be taught metacognitive strategies. But telling them about the importance of such strategies is a start.

Brown (1982) makes several recommendations. One is that students be made aware of the structures of stories and exposition and use reading strategies that are appropriate for the various structures. This, of course, is a topic I considered in another section of this module. Another of Brown's recommendations is that students be taught to carefully consider their purposes in reading. Another is that students be taught specific remedial strategies such as looking back, rereading, or consulting a dictionary. Still another is

that students be taught a variety of study strategies and when to use them. Thus, Brown would agree that teaching a strategy such as SQ3R can be useful, but she argues that teaching other strategies and teaching students when to use the various strategies is also important. The Brown, Campione, and Day paper in the Appendix elaborates on these suggestions.

One last suggestion is that students be taught to become active questioners. A paper on teaching students to be active questioners by Harry Singer is presented in the Appendix.

In concluding this section on teaching generative comprehension, I want to soften a somewhat negative message I included in the introduction to the comprehension section of the module. At that point, I noted that there still is not a lot of direct evidence on just what constitutes effective comprehension instruction. The statement is accurate. However, as I look over the suggestions for teaching generative comprehension skills, I see a lot of extremely reasonable teaching suggestions, and ones that seem very likely to be successful.

## Concluding Remarks

In the beginning of this module, I noted that our understanding of the reading process is much fuller than it was a few years ago, our reasons for employing certain sorts of instruction rather than other sorts are much better articulated than they were a few years ago, and the empirical evidence for both our theories and our instructional techniques is radically stronger than it was a few years ago. As I consider the whole of this report, it seems to me that these were not overstatements. Schema theory, the interactive-compensatory model of reading, and the concept of automaticity really do suggest some rather specific instructional procedures. The literature on teaching effectiveness--with its emphasis on teacher directed instruction that keeps students actively

engaged in academic learning and promotes success--says a lot about how to run classrooms. And instruction in vocabulary, assisting students in understanding specific texts, and teaching generative comprehension skills are all activities that should lead students of all abilities to become competent readers.

In conclusion, I want to make a plea that is particularly relevant to less able readers. Learning to read well requires a lot of practice. If students are going to become proficient readers and learn to enjoy reading and to use reading as a tool for learning, they are going to have to read extensively. As Allington (1977) put it after observing that students in remedial reading classes do little reading, "If they don't read much, how are they ever going to get good?" (p. 57). They're not.

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# Fry's Readability Graph: Clarifications, Validity, and Extension to Level 17

EDWARD FRY

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I find myself in the somewhat untenable position of having several books in print (Fry, 1963, 1972, 1977) that give differing instructions regarding the inclusion of proper nouns when using the Fry readability graph. The latest book, a version of the graph in slide rule form (Fry, 1976), suggests that proper nouns should be included in the word count, and this article will discuss briefly the reasons for including them. In addition, I would like to take up some other areas related to readability estimates and the use of my graph. Specifically, a number of questions have been presented to me regarding somewhat detailed but very real problems such as what a syllable is and what a word is—for example, is *stopped* a two syllable word, and is *1945* or *IRA* a word? A third area concerns the problems of validity and reliability of readability scores, and recent work being done on new ways to establish this. Finally, an extension of my graph upward into the college levels will be presented.

I must confess that when I first developed the readability graph in

Africa in about 1961, I had no idea that anyone would take it very seriously, or that so many thousands of people would start using it. If I had, I might have put more care into its development, but on the other hand, if it was to be a large research project with a proper statistical design, it might have never seen the light of day. Its original purpose, and its present purpose, is to aid teachers and editors to help children or adults read better by giving them material on the proper difficulty level.

At the time of the graph's origin, I had a Fulbright lectureship at Makerere College in Uganda, and my purpose was to help a group of African teachers on a UNESCO training project who were teaching English as a second language. It was first published in a British journal (1964) and as an appendix in my book, *Teaching Faster Reading* (1963), which was also originally written for those same Unesco teachers. As near as I know, for years nobody ever used the graph; it was not reprinted or cited, nor did I get any informal feedback about usage. From this, I can possibly conclude that American educators do not read British journals, or that its essentially British designations (1000 word level, 2000 word level, etc., and the Oxford English Readers series book levels) were too parochial. It might also be that readability was not a terribly popular topic in the early 1960s; certainly it doesn't use up much space in teacher training books of that period.

However, under the principle of "never throw out your old good ideas, just dust them off occasionally and see if they will fly," I started doing a bit more with readability in teacher training. Next, I added some Americanization (grade levels) and validation of the graph at the secondary level (Fry, 1968) and the primary level (Fry, 1969). It was after the appearance of these two articles that American educators began to use the graph, first in teacher training classes, then in textbooks.

Certainly, readability had been around for a number of years, possibly formally beginning with Lively and Pressey in 1923, but few people outside of reading specialists and researchers used it. Then readability began getting great surges of momentum from other formula builders, such as Lorge in 1939, Flesch in 1943, Dale and Chall in 1948, and Spache in 1953. When teachers began asking publishers about the readability of their books, the publishers began to take a greater interest in readability.

The Readability Graph's contribution seems to be in simplicity of use without sacrificing much, if any, accuracy, and its wide and continuous range from grade one up through college. That it was not copyrighted and could be reproduced on one sheet of paper might have helped also.

Surprisingly, few people ask me what the curved line in the graph represents (it has little to do with the graph's use). Not deterred by this lack of curiosity, I will tell you anyway. It is the smoothed mean of the plots of sample passages. If you plot a large number of passages with a wide range, they will tend to fall somewhere near the line. In short, it is an "eye ball" job. However, my friends in higher mathematics tell me that "smoothing a curve" in this manner is just about as accurate as

doing it by complicated formula.

The grade areas were assigned the same way, only this time the grade level for each plot was necessary to delineate concentrations. The grade lines were made perpendicular to the curved line (which is one reason the curve was made in the first place), and they were adjusted a little when correlation studies were done with more material and other formulas, such as the Spache and the Dale-Chall. It is of moderate consternation that the grade level areas came out unequal size, but I chose to follow the old researcher's maxim: "When in doubt, believe the data."

Fortunately, time and other research studies have continued to show the efficacy of the two inputs of the graph, syllables and sentence length. Klare (1974-1975), a widely recognized bibliographer of readability studies, has summarized:

> Unless the user is interested in doing research, there is little to be gained from choosing a highly complex formula. A simple 2-variable formula should be sufficient, especially if one of the variables is a word or semantic variable and the other is a sentence or syntactic variable... If the count is to be made by hand, counting syllables in some fashion... is somewhat faster than using most word lists.

Zipf's (1965) principle—that higher frequency words are shorter—seems intact.

**Include Proper Nouns**

It is always embarrassing to admit mistakes, especially if they are in print and thousands of people know about them, but I think I made a mistake in the 1968 article in which I included the sentence in the graph directions. "Don't count proper nouns." The first two publications of the graph (1963 and 1964) said nothing about omitting proper nouns. Somehow or other, possibly because of influence of other formulas which had specific instructions about not counting proper nouns, I omitted them in 1968. I would like to reverse this decision now and say that they should be included.

The reasons for doing this are simultaneously subjective, logical, and empirical. Proper nouns do contribute to the difficulty of the material. It is easier for a child to read "Joe" than "Joseph," and children or adults certainly do not skip proper nouns in most reading. Complaints about using proper nouns do not come from teachers, but most often from editors of texts who have difficulty in getting the readability low enough for the grade level at which they hope to sell the book.

Empirically, both the 1968 article and a recent thesis by Zingman (1977) show that the grade level designations of the graph are a little on the low side, compared with other formulas (about a year, in many instances), when the graph is used without proper nouns.

A recent study by Britton and Lumpkin (1977) using a large number of samples and comparing the Fry formula (with proper nouns) and five other formulas plus publisher designations, also tends to support the inclusion of proper nouns. The data in the table show almost perfect agreement in ranking and close agreement in grade level designations.

Britton and Lumpkin, incidentally, used my formula slightly differently from the published directions; they averaged a large number of grade level designations and thus obtained

**A Comparison of Publishers' Designations with Six Readability Formulas for the Ginn Reading 720 Series (1976)**

| Publisher's Book Level | No. of 100 word samples | Readability | | | | | |
|---|---|---|---|---|---|---|---|
| | | Fry[a] (1-13)[b] | Harris-Jacobson (PP - 8+)[b] | Spache (1-3)[b] | Dale-Chall (4-16)[b] | Flesch (5-17)[b] | Farr-Jenkins-Patterson (5-17)[b] |
| Preprimer | 8 | 1.0 | .5 | 1.3 | | | |
| Primer | 8 | 1.0 | 1.0 | 1.6 | | | |
| 1 | 23 | 1.1 | 1.2 | 1.7 | | | |
| $2_1$ | 26 | 2.2 | 1.8 | 1.9 | | | |
| $2_2$ | 26 | 2.7 | 2.5 | 2.3 | | | |
| $3_1$ | 26 | 2.7 | 2.6 | 2.5 | | | |
| $3_2$ | 20 | 4.0 | 3.1 | 2.7 | | | |
| $4_1$ | 26 | 4.2 | 3.7 | | 5.3 | | |
| $4_2$ | 29 | 4.4 | 3.8 | | 5.3 | | |
| 5 | 26 | 5.8 | 5.3 | | 6.7 | 6.8 | 8.7 |
| 6 | 37 | 6.6 | 5.6 | | 7.5 | 7.2 | 8.9 |

Source: Abstracted from *A Consumer's Guide on Readability* by Gwyneth Britton and Margaret Lumpkin. G. Britton and Associates, Corvallis, Oregon, 1977.

[a] The Fry word and syllable count uses proper nouns.

[b] The numbers in parentheses are the range of the formula in grade levels. This also explains why all formulas are not used at all levels.

grade level designations with a decimal point. The regular directions call for the averaging of the syllables and sentence length, *then* entering the graph to get a whole grade level designation. I do not find their procedure objectionable since they did it with a large number of samples (on a computer). However, users must continually be aware that readability scores are estimates and that individual samples jump around a mean score, as was demonstrated by Coke and Rothkopf (1970) (see figure).

By including proper nouns in the count, if we err, we err on the side of the angels, or perhaps you might say on the side of the children, if you perceive the two not to be synonymous. Causing the teacher to select easier books for the child to read will do nothing but increase the child's comprehension, pleasure, and inclination to keep reading.

**Syllables and Words**

Graph users sometimes have a little bit of trouble in determining syllables. Much of this is caused by a dissonance between phonetic and graphic considerations. To illustrate, *wanted* is a two-syllable word but *stopped* is one-syllable. The quick answer is, believe what you hear, not what you see. In other words, when counting syllables, go by speech sounds. Fortunately, most people, including children, can fairly accurately determine the number of phonetic syllables in a passage. Children don't have any trouble syllabifying *Sall-y-is-a-scard-y-cat.*

The problem comes with literate

teachers who know that many affixes form separate syllables. They do have a leg to stand upon, because morphology influences syllabification, but an overriding principle is that every syllable has a separate vowel sound.

In most prose counts, there is no problem in defining what a word is, but for those graph users who request a more precise statement, I suggest the computer definition: A word is a symbol or group of symbols bounded by a blank space on either side. Thus, *1945*, *&*, and *IRA* are all words.

A problem now arises as to how many syllables you allot for these strange words. In an effort to keep it simple but logical, I suggest that each symbol receive a syllable count of one. Thus, *1945* is four syllabies, & is one, and *IRA* is three.

In the case of initialisms like *IRA*, where each letter is spoken, the rule follows the general phonetic syllable principle, and *US* is easier to read than *USOE*. Numbers are similar—there is surface validity to the idea that 43,172 is harder to read than 72, which is harder to read than 2. This suggestion might aid those who tackle the difficult problem of readability of mathematics texts.

Incidentally, I have been asked many times about how to use readability formulas on mathematics textbooks. There is no simple answer. Readability formulas were made for prose, not numerical formulas or poetry. The new policy stated above will help in the prose parts of the math text, but the parts that have many numbers or mathematical formulas must rely on another type of difficulty evaluation. I suggest that there is no substitute for trying out the passage or book on a sample population for whom the book is intended.

**Reliability and Validity**

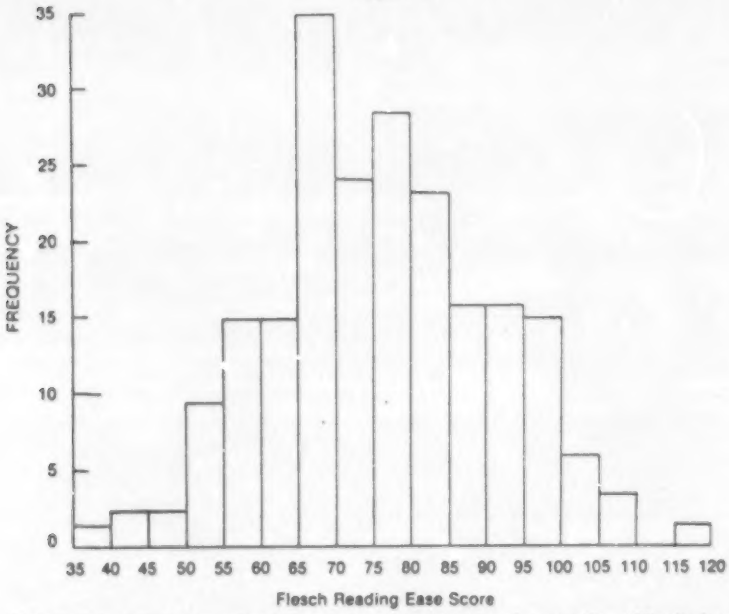
A readability formula is in many respects like a reading test, except instead of testing children, it tests written material. Hence, it is proper to assume that many testing concepts should apply. Readability formulas are not strong in reporting either reliability or validity.

We can assume that the formulas have at least a modest amount of reliability because they consistently correlate fairly well with each other, but direct measures and useful statistics like Standard Error of Measurement are usually not given. As a notable exception, George Spache (1966) reported a probable error of 3.3 months.

When trying to find the reliability of a formula, we encounter the problem that written prose samples contain a good deal of variability. When Coke and Rothkopf (1970) programmed a computer to continuously sample every hundred words for a 20,000 word passage, they found that the readability scores tended to follow a normal distribution curve. We could expect that writers have different amounts of variability or consistency in writing on grade level; hence, if unreliability is found, it could be the formula, or it could be the variability in writing.

Validity of formulas is approached in a number of different ways, such as correlations between formulas or correlations with comprehension scores, with cloze scores, with oral reading errors, with observer judgment, and with written passages of known difficulty. My graph has been validated by interformula and

Figure 1




This graph shows an approximately normal distribution of readability difficulty levels when 200 continuous 100-word samples were rated for readability using the Flesch Reading Ease Scores on a passage about modern physics. It illustrates why it is necessary to take multiple samples from a passage in order to arrive at a true mean score. Graph taken from Coke and Rothkopf (1970).

comprehension scores (Fry, 1968) and oral reading errors (Fry, 1969; Paolo, 1977). Indirectly, it is validated by studies such as Zingman's (1977) and those by Dulin (1969), who did readability on a number of national news stories, and by Britton and Lumpkin (1977), who found that the graph produced scores similar to those from other formulas (see table).

Another method of estimating readability is by using judges. Developing the SEER (Singer Eyeball Estimate of Readability), Singer (1975) had thirty-two college students judge eight paragraphs ranging from grades one to seven. He concluded, "Results revealed the average discrepancy in readability levels established by the SEER technique and those computed by readability formulas (Spache and Dale-Chall) was less than one grade level. Moreover, the SEER technique was as valid as the Fry graphed procedure, but took much less time, an average of only two minutes per paragraph." I might point out that if you wish to save all this time and get the same degree of validity reported by Singer, you have to have thirty-two judges working for two minutes, then average their findings.

Carvor (1975-1976) also compared the graph with his Rauding technique, which used trained judges for

comparing prose samples against a standard. He also compared the graph with cloze rankings (Bormuth levels). The graph correlated .85 with Rauding technique and .81 with Bormuth level. Incidentally, it correlated .95 with Flesch and .85 with Dale-Chall.

However, both Singer and Carver have demonstrated that it is possible to judge the difficulty levels of unknown writing samples subjectively, and this can be seen as a contribution to the validity of readability formulas.

It might also be noted that Singer, and many others, use the graph in a manner contrary to directions, namely, they take the estimated grade level based on only one sample. The directions state that three or more samples should be averaged. The graph will yield a grade level score for a 100 word sample, but the user should be aware that there is necessarily a sacrifice in both reliability and validity.

A very interesting validation of readability formulas has been done in journalistic studies. I am mentioning it here, not because it is new but because it is in literature not always searched by reading researchers. Journalists tend to use such techniques as split runs, in which half the papers carry an article written at one grade level and half carry it written at a lower grade level. They then sample the readership utilizing such dependent variables as amount of people reading the story and number of paragraphs read. Writing to lower readability often substantially increases readership (Lyman, 1949; Murphy, 1947; Swanson, 1948).

Researchers are continually looking for new methods of validating readability formulas. Ernest Rothkopf at Bell Laboratories is currently experimenting with something called "functional chaining." In simplified terms, a functional chain is the number of words a typist can continue typing after the copy has been removed from sight. This was found to be related to the Flesch reading ease index, syntactic complexity, familiarity with topical content, and eye movement patterns during learning. This is similar to the work of Holgerson (1977) who compared eye-voice span on passages of differing difficulty and with readers at different levels.

Hardyck and Petrinovich (1970) found that when students are asked to read easy and hard passages silently while sensitive measures of muscle activity in the oral area are recorded, subvocalization increases as reading difficulty of material increases. In an extension of this work at the Rutgers Reading Center, Leo Campbell is using myographs to record oral muscle activity during reading of passages that increase in syntactic difficulty and of passages that increase in vocabulary difficulty.

In summary, readability formulas can be validated by a wide variety of measures, and their reliability is attested to by intercorrelations. However, this does not mean that there is not plenty of work left to do in the way of refinements as well as basic understandings.

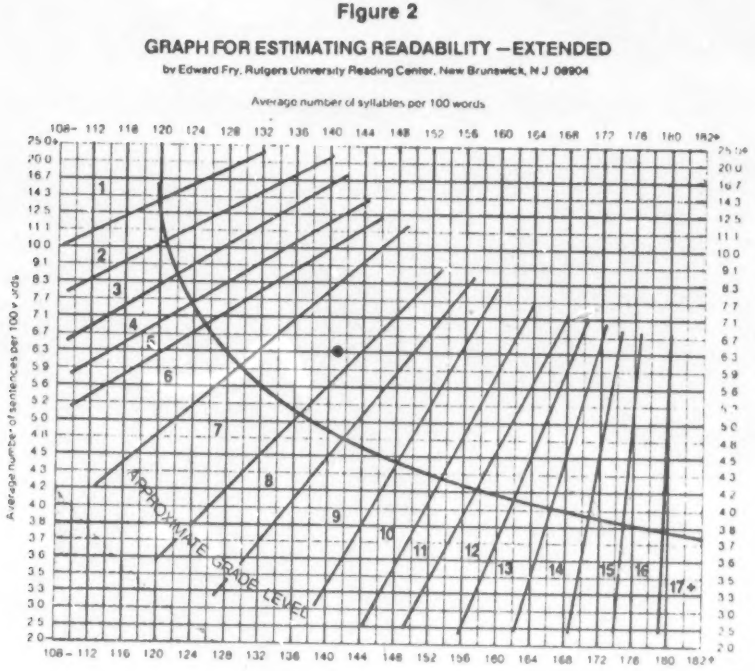
**Graph Modifications**

Several investigators have attempted to refine my readability graph. Maginnis (1969) extended the graph downward into the preprimer levels and used it with shorter passages. Considering the general

## Figure 2

### GRAPH FOR ESTIMATING READABILITY—EXTENDED

by Edward Fry, Rutgers University Reading Center, New Brunswick, N J 08904




### Expanded Directions for Working Readability Graph

1. Randomly select three (3) sample passages and count out exactly 100 words each, beginning with the beginning of a sentence. Do count proper nouns, initializations, and numerals.
2. Count the number of sentences in the hundred words, estimating length of the fraction of the last sentence to the nearest one-tenth.
3. Count the total number of syllables in the 100-word passage. If you don't have a hand counter available, an easy way is to simply put a mark above every syllable over one in each word, then when you get to the end of the passage, count the number of marks and add 100. Small calculators can also be used as counters by pushing numeral 1, then push the + sign for each word or syllable when counting.
4. Enter graph with *average* sentence length and *average* number of syllables; plot dot where the two lines intersect. Area where dot is plotted will give you the approximate grade level.
5. If a great deal of variability is found in syllable count or sentence count, putting more samples into the average is desirable.
6. A word is defined as a group of symbols with a space on either side; thus, *Joe, IRA, 1945,* and *&* are each one word.
7. A syllable is defined as a phonetic syllable. Generally, there are as many syllables as vowel sounds. For example, *stopped* is one syllable and *wanted* is two syllables. When counting syllables for numerals and initializations, count one syllable for each symbol. For example, *1945* is four syllables, *IRA* is three syllables, and *&* is one syllable.

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Note: This "extended graph" does not outmode or render the earlier (1968) version inoperative or inaccurate; it is an extension. (REPRODUCTION PERMITTED—NO COPYRIGHT)

lack of pinpoint reliability of formulas, this distinction within grade levels is not warranted. I have no reason to think that my graph is any more accurate than Spache's, for example, and he only knows where a book is within .6 of a year and 50 percent of the time. Also, on a logical level, a beginning reader is so dependent on the particular basal series that he has used in the first half of the year that there seems to be little benefit in determining a generalized readability for that level. Kretschmer (1976), on the other hand, tried to improve the accuracy of the graph by adding a set of vocabulary words to be consulted. This tends to complicate the graph's use, and unless he or somebody can demonstrate that there is a significant improvement in accuracy, we should hold this modification in abeyance.

There have been numerous attempts to improve readability determination through studying syntax variations. Two of these have been closely related to the graph and some work that I have done. At the twenty-fourth annual meeting of the National Reading Conference, I proposed the Kernel Distance Theory, which tried to explain why two sentences containing essentially equal words, hence equal length and equal syllables and the same or nearly the same meaning, can have unequal difficulty (Fry, 1975a). For example:

> No belief, if injustices and evils are to be eradicated, can be regarded as infallible.
>
> No belief can be regarded as infallible if injustices and evils are to be eradicated.

The Kernel Distance Theory defines the kernel of a sentence as the noun (subject), verb (predicate), and sometimes an object. Distance applies to any word or phrase not a part of the kernel. The theory then states that distance between the noun and the verb makes the sentence harder than does distance outside the kernel, as in the example above.

This part of the theory was confirmed in a dissertation by DePierro (1976), who presented pairs of sentences to fifth and sixth graders and to college undergraduates and asked them to recall the sentences; he also noted their silent reading time and response time after presentation. It was also confirmed in a master's thesis by Weber (1977), who used subjective judgment of junior college students.

Two other parts of the theory were not confirmed: that distance before the kernel caused more difficulty than distance after the kernel, and that distance between noun and verb caused more difficulty than distance between verb and object.

This research has more implication for writers than for construction of readability formulas. It suggests that one way writers can lower readability levels is to avoid splitting the kernel of a sentence; however, this will not affect the readability score on most formulas.

Another way of looking at grammatical complexity was investigated by Pearson (1974-1975), who pointed out that in some specific instances, longer sentences produced better comprehension than short sentences. For example, when two short sentences were put together and a "because" was added, questions about the relationship between the sentences were easier. Pearson



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is undoubtedly correct in specific instances, as is the Kernel Distance Theory in the noun-verb split instance, but these specific conditions are statistically not common, and I believe that Klare's general statement about sentence length increasing difficulty still holds for general use.

**Graph Extension**

With considerable trepidation, I have extended the graph through the college years by simple extrapolation. The college year areas are based on the average areas for the preceding three years. It is known that vocabulary continues to increase throughout the college years; however, I openly confess to not having any data about the difference between thirteenth through sixteenth grade material. I do hope someone will gather some for validation.

In the meantime, I have had requests for some kind of objective measurement of material difficulty in the college areas. I am, therefore, proposing this extension as a relative difficulty differentiation rather than a normed score. In other words, I believe that it is somewhat defensible to state that a book scoring at level sixteen is more difficult than a book scoring at level fourteen, but it is not appropriate to say that one is suitable for college seniors and the other for college sophomores.

Part of the difficulty in determining college norms is that college populations have wide divergences in academic qualifications of students. College reading ability also tends to become very "subject specific." That means that what may be normal reading for a physics student could be quite difficult for a philosophy student and vice versa. These variables are all in addition to the readability principle that "High motivation overcomes high readability level, but low motivation demands a low readability level" (Fry, 1975b).

This article is intended to update readers on some background and some activity in the area of readability with particular reference to my readability graph. Readability continues to be an active area of research and fortunately an actively used tool for practicing teachers and curriculum material developers. I hope that some of the new rules on word count and the extension to college level material will prove helpful and that some of the discussion of recent research will stimulate others to work in this interesting area of the reading field.

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## If Your State Needs Legislation on Reading

Call your legislator COLLECT—he'll remember you better next time.

Always introduce yourself, "I'm legislative chairperson of IRA from _____, we represent more than 16,000 people" (or whatever impressive number).

Cultivate a legislator who'll carry your bill.

Cultivate the secretaries of the legislators—they'll help you.

*Don't assume* that a legislator who was in education is now *pro*-education.

Suggestions from Barbara Valdez, Sacramento, California, made at the state and local councils meeting on legislation at the Anaheim convention, May 1976.

## Hall of Fame Members Named

Dr. Gertrude H. Hildreth and Dr. Russell G. Stauffer have been elected by members of the Reading Hall of Fame to membership in that organization.



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# Evaluating Social Studies Materials: Readability Formulas Are Not the Only Answer

CHARLES W. PETERS

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*Charles W. Peters is a Secondary Reading Consultant for the Oakland Schools in Pontiac, Michigan.*

One of the most vexing problems which plagues social studies teachers is the inability of many of their students to comprehend the printed material they encounter in the classroom. While many factors can contribute to reading difficulties (density of important concepts, inadequate cognitive strategies, language problems, inadequate auditory and visual perception), one aspect of the problem that has caused much consternation among social studies teachers has been the difficulty level of textual materials.[1] While the situation seems to be improving in at least one area—the reading level of textbooks[2]—other equally important factors affecting the difficulty level of material remain unchanged.

In fact, currently there seems to be too much emphasis placed upon readability level at the expense of other equally important variables, e.g., the types of questions which appear in textual materials, the organizational structure of the material, the conceptual level of the material, etc. Too frequently users of readability formulas have attempted to establish a cause-and-effect relationship between length of a sentence, complexity of vocabulary, and the difficulty level of the material. Supposedly, if one reduces both the length of a sentence and the number of syllables a word contains, the material will be easier to read. As the following example reveals, this is not always the case.

> The pundit was pedantic. He was also erudite in his didactic activities. However, his speech revealed him to be an acrimonious polemic. Some found his remarks to be lucid but vexing. Only a few were bemused and strident. No one was reticent. [6th grade reading level as calculated by the Fry Readability Formula]

Obviously, most sixth graders would have difficulty with this passage. Reducing the reading level of material does not always increase the readability level. In addition, readability formulas cannot measure such factors as the conceptual load of the material, the clarity of the lexical meanings, the interest level of the material, the effectiveness of adjunct aids, or the adequacy of the organizational structure of material. This is not an attempt to denigrate the use of readability formulas, because they are an important evaluative tool. Rather, I would like to suggest that they be viewed in relationship to other important variables that also contribute to the difficulty level of printed material. Unfortunately, such factors receive proportionally less attention when the acceptability of textual material is determined.

The message seems clear. If social studies teachers want a more accurate method for assessing the difficulty level of their materials, a number of criteria must be systematically considered: (1) the method of conceptual presentation, (2) the organization of concepts, (3) the questioning strategy, (4) the utilization of adjunct aids, and (5) the use of structural aids. Therefore, the purpose of this article is to explore how these criteria can be used by social studies teachers to assess the difficulty level of the material they use or might want to use in their classrooms.

### Concept Presentation

Very few social studies teachers would question the importance of concepts; yet the method used by social studies materials to present concepts does not appear to be a major priority in the selection of classroom materials, despite the fact that social scientists who have researched this problem have found that most textbooks contain insufficient information.[3] Ratcliffe[4] and Johnson[5] have both demonstrated that fifth, eighth, and eleventh grade social studies textbooks do not provide the details, examples, or insights needed for students to develop concepts about key ideas that teachers insist should be part of their repertoire of knowledge when they complete a course in social studies. Lee and Anderson[6] in a comprehensive study have



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pointed out that social studies textbooks that employ inadequate details, examples, or insights cause students to formulate overgeneralizations which further impede the comprehension of concepts. The implications of these studies are important because they suggest that many textbooks are not providing sufficient information for students to develop an adequate understanding of important concepts.

In order to ascertain whether textbooks define concepts adequately, the following criteria are suggested. First, there should be a clearly stated definition. While almost all textbooks provide definitions, it is the quality of the definition that is important. One feature that distinguishes an acceptable definition from an unacceptable definition is whether a concept is defined in terms of its critical attributes or distinguishing features. For example, while both the Progressive and Populist movements contained elements of political reform, they are separate and distinguishable movements; the qualities that make them distinctively different are their critical attributes. A critical attribute of the Populist movement was that it had an agrarian base, while a critical attribute of the Progressive movement was its urban base. This, as well as other distinguishing features, should be explicitly stated in the definition.

Second, the concept should be placed in a superordinate-coordinate-subordinate relationship to other related concepts. Figure 1 illustrates the type of relationship that should be obvious from the stated definition. When concepts are not presented in relationship to one another, the material becomes more difficult to comprehend.

Third, the definition should be followed by examples and non-examples. While most textual materials use examples, many of them do not use non-examples. As the previously cited research has indicated, one of the leading problems with many textbooks is that they lead to overgeneralization. Non-examples help alleviate this problem. Using the previous example of the Populist and Progressive movements, a non-example of political reform for the Progressive movement would be the Subtreasury Plan because it was basically an attempt to solve the problem of over-production of agricultural products by developing a procedure for government intervention. The student would have to know from the definition that this example possesses all the critical attributes of the Populist movement. Non-examples and examples are predicated upon the critical attributes of a concept. Non-examples lack one or more of those distinguishing features while examples must contain all of them.[7]

While it may be unrealistic to assume that social studies materials will contain all of these features, teachers should look for as many of these qualities as possible. However, if the material does not contain an adequate definition for each of its important concepts, do not use the book, because the lack of such features contributes to the difficulty level of the material. In addition, the analysis of concepts should not be a cursory examination; instead, the teacher must closely scrutinize the method of presentation. A word of caution—it is very easy for a person with a great deal of knowledge about a specific subject to assume the information presented is adequate when in reality most of the information is not on the printed page but rather in the teacher's head. Be sure to avoid this assumption when analyzing social studies materials.

### Organization of Concepts

Related to the way in which textual materials define concepts is the manner in which concepts are presented at both the beginning and the end of a chapter. One of the least effective techniques, as far as learning is concerned, is to introduce or summarize concepts either in alphabetical order or in the sequential order in which they are presented in the chapter. Research investigating learning strategies seems to suggest that individuals learn best when information is presented in the form of relationships.[8] For this reason, when selecting textual material determine if concepts are presented in an organized manner which illustrates their interrelationship. Figure 2 provides an example of the manner in which most concepts are presented while Figure 3 represents the way in which concepts should be presented. Obviously the organized list is much easier to learn because

Figure 1.—Hierarchial Presentation of Concepts

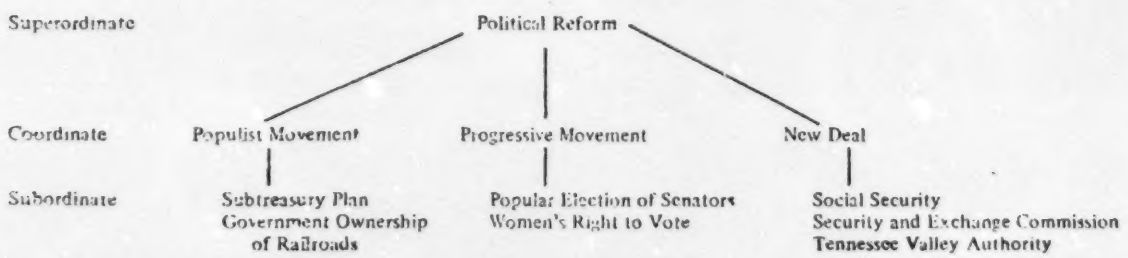




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**Figure 2.–Unorganized Conceptual Presentation**

Thirteenth Amendment
Fourteenth Amendment
Fifteenth Amendment
Radical Republicans
Freedmen's Bureau
"10 Per Cent Plan"
Wade-Davis Bill
Grandfather Clause
"Jim Crow" Laws
White Primary
Carpetbaggers
Poll Tax
Amnesty Act
Reconstruction
Scalawag
Plessy vs. Ferguson
Ku Klux Klan
Civil Rights Act of 1866
Reconstruction Act of 1867

**Figure 3.–Organized Conceptual Presentation**

Reconstruction
Lincoln's Program
- 10 Per Cent Plan
- Freedmen's Bureau
- Thirteenth Amendment

Radical Republican's Program
- Wade-Davis Bill
- Fourteenth Amendment
- Fifteenth Amendment
- Civil Rights Act of 1866
- Reconstruction Act of 1867
- Amnesty Act

Northern Reformers
- Carpetbaggers

Southern Reformers
- Scalawag

Reaction to Reform
- White Primary
- "Jim Crow" Laws
- Plessy vs. Ferguson
- Ku Klux Klan
- Grandfather Clause
- Poll Tax

students can clearly perceive the relationship between the concepts. In the other example the concepts are presented as a series of unrelated terms.

If you would like to test this hypothesis, merely present the unorganized list of words to a group of students for one minute and then ask them to recall as many of the terms as possible. Then give them the organized list for one minute and see how many they can recall. In most instances they should retain more words from the second list. Since it is easier to learn concepts presented in relationship to one another, textual materials that have organized them in a structured manner facilitate the learning process by making the terms easier to comprehend. Conversely, textual materials which have not organized concepts in this manner increase the difficulty level of the materials.

**Questioning Strategy**

A third major area of concern is the types of questions the textual materials present at the end of a section or chapter. The reason why questioning strategy is important to social studies teachers is that many questions which appear in textbooks are at the literal level of comprehension. Most social studies teachers want their students to become critical readers; however, this is impossible if only literal questions are asked. Therefore, if critical reading is one of the goals of the social studies program, then material must contain a balanced questioning strategy. Barrett's Taxonomy[9] is a good device to utilize when attempting to ascertain whether the material contains a balanced questioning strategy. According to this taxonomy comprehension is subdivided into four levels:

(1) *Literal Recognition or Recall.* Literal comprehension requires the student to recall or recognize information that is explicitly stated in the text.
(2) *Inference.* Inferential comprehension requires the student to synthesize information that is implicitly stated in the text.
(3) *Evaluation.* The evaluative level of comprehension requires the student to make judgments about the material read.
(4) *Appreciation.* The appreciative level of comprehension requires the student to respond to the literary techniques, forms, styles, and structures employed by the writer.

Social studies teachers will find the first three levels the most applicable to their material. However, this does not preclude the use of the fourth level when it applies to the material being read. In evaluating the questions presented in textual materials teachers should attempt to rate each one according to Barrett's Taxonomy.

One additional benefit derived from this type of analysis is that teachers can also begin examining their own questioning strategies. For instance, a common fault among many social studies teachers is to discuss a topic in class and then ask students on an examination to summarize that information by responding to what the teacher believes is a critical thinking question, when in reality what is being asked for is a summary of previously presented information. Such a request only requires students to function at the lowest level, that of literal comprehension. For example, if the causes of the Civil War are discussed and, through some type of Socratic method, the class arrives at an acceptable consensus as to the causes of the Civil War, and on the examination the teacher asks in one form or another for students to explain the causes of the Civil War and expects responses similar to those arrived at in the class discussion, then all the teacher has asked for is literal recall of information. Teachers can prevent this type of situation from



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Figure 4.—Pictorial Adjunct Aid

NS - Neutral Stimulus
UCS - Unconditioned Stimulus
CS - Conditioned Stimulus
CR - Conditioned Response
R - Response

(Reprinted from: Edmund Fontino et al., "Understanding Psychology" (Del Mar, Calif.: CRM Books, 1974), p. 133.)



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occurring by applying Barrett's Taxonomy to both the questions they ask in class and the questions they ask on their exams.

### Adjunct Aids

A fourth factor to consider when selecting textual material is how effectively the material utilizes adjunct aids, i.e., editorial cartoons, graphs, charts, paintings, illustrations, figures, maps, and pictures. Adjunct aids are designed to facilitate the comprehension process by augmenting the printed presentation of information. In many instances they serve as alternatives to print. Unfortunately, many teachers treat adjunct aids as "filler" material, that is supplemental information which is perceived as having only a modicum of instructional value. However, the converse of that premise is true. Many students, including those who have difficulty comprehending printed material, have learned to rely heavily upon adjunct aids. For this reason, the quality of these adjunct aids should be an important consideration when evaluating textual material.

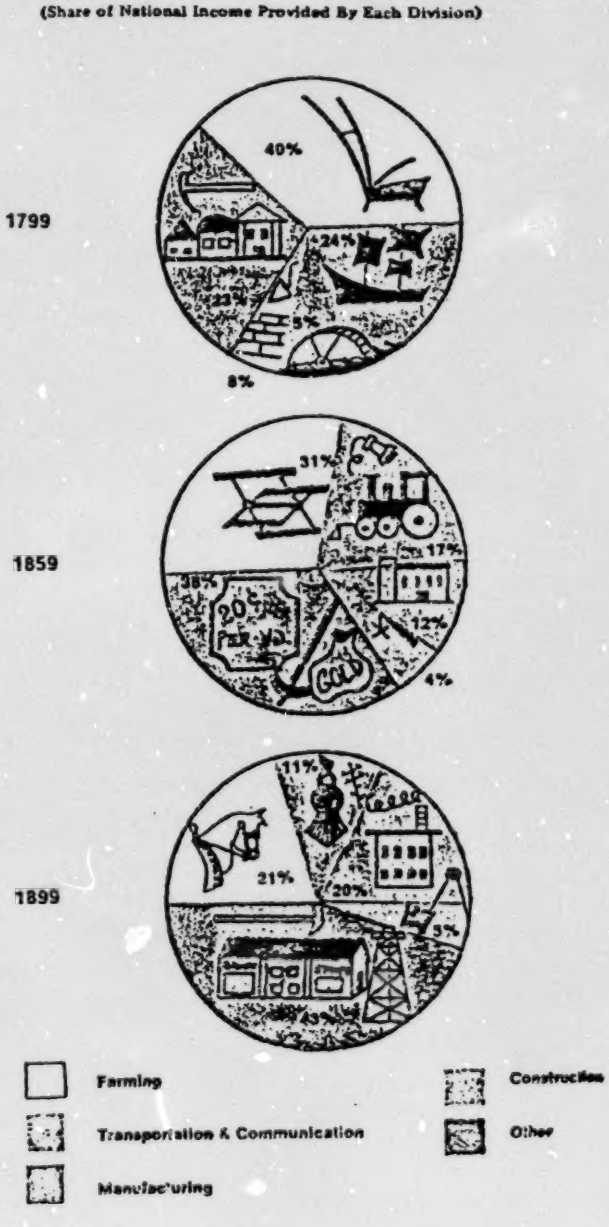
The following criteria should be utilized when evaluating adjunct aids.

(1) They should be clearly focused and easily interpretable.
(2) They should not make conceptual assumptions, i.e., be more complex than the written explanation of the idea or ideas.
(3) They should be designed to facilitate the comprehension of printed materials.
(4) They should be easily integrable into the instructional program.
(5) They should be relevant to the overall topic or topics being presented.
(6) They should be technically and artistically well done.
(7) They should be sequentially developed.

Figures 4, 5, and 6 illustrate some strong as well as weak points in regard to the utilization of adjunct aids. Figure 4 is a good example of how a complex idea can be presented pictorially. For instance, look at the last three frames. Notice how easily discernible the sequence is. The reader can detect a time change by both the length of hair and the emergence of a beard.

Figure 5 illustrates two factors which can make adjunct aids particularly difficult for some students to interpret correctly. First, five different areas of industrial growth are represented [in the original chart] by five different colors. However, the color variations in the chart probably would not be that palpable to all students, because in the original there are two shades of red and two shades of blue which are almost identical. Second, while the key labels in each are clearly presented, the figures within the various categories can be confusing. For instance, in the category "other" does the 20¢ figure in the 1859 chart represent cloth? If so, why is it not under manufacturing? This is the kind of additional burden which further contributes to the difficulty level of some material. Figure 6 provides a clear

Figure 5.—Graphic Adjunct Aid




(Reprinted from: Martin Sandler et al., "The People Make a Nation" [Boston, Mass.: Allyn and Bacon, Inc., 1971], p. 366.)

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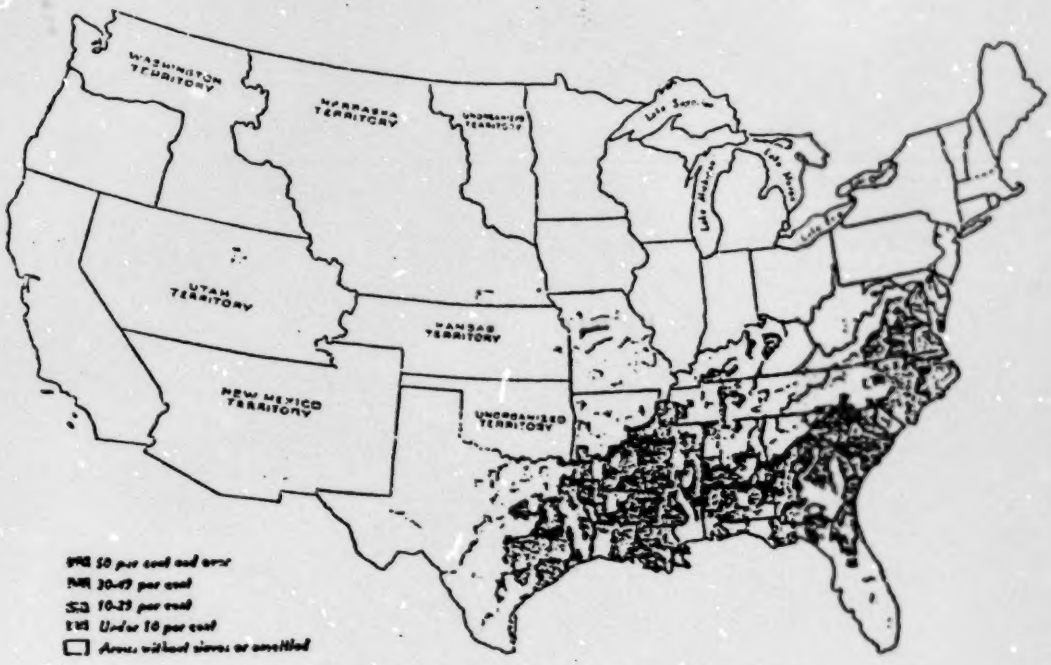
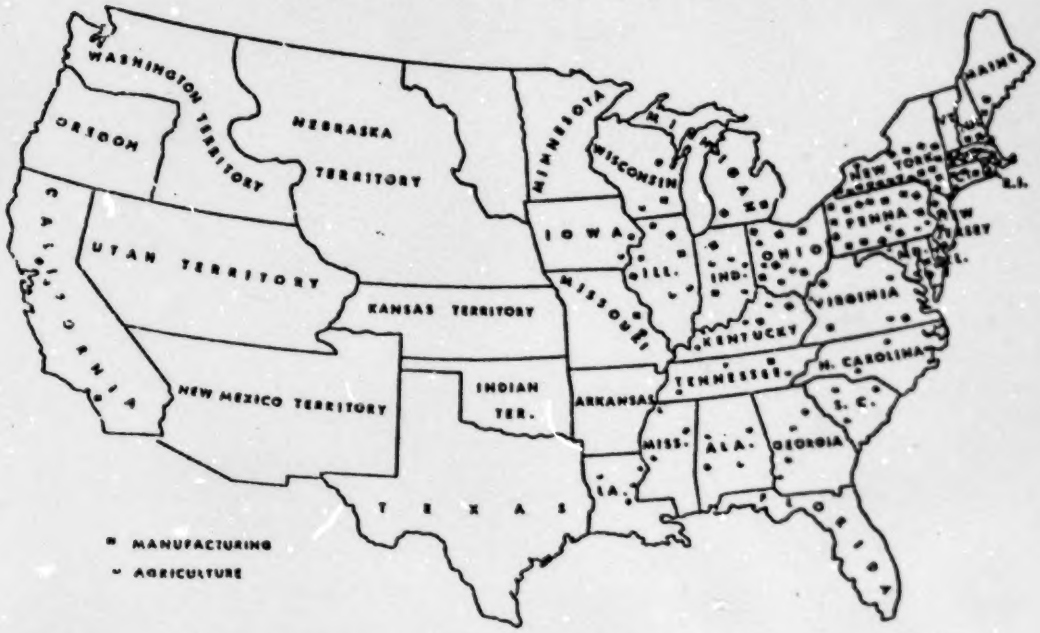
Figure 6.—Map Adjunct Aid




Proportion of Slaves to Total Population, by County, 1860

AGRICULTURE AND MANUFACTURING 1860




(Reprinted from: Sandler et al., "The People Make a Nation," p. 293.)



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delineation [the original is in color] of the proportion of slaves to total population while at the same time comparing it to the economic diversity that existed between the North and the South. One does not necessarily have to read in order to discern that this could be one possible explanation for the cause of the Civil War.

Graphs and charts that are properly constructed should summarize major concepts presented in the chapter. Therefore, if a student finds the printed text too difficult to read (and given the range of an average social studies class as many as thirty to thirty-five percent of the students might fall into this category), then adjunct aids become extremely important to the comprehension process. The question is not one of quantitative use of adjunct aids. Most social studies materials have adjunct aids—but what is the quality of those aids?

### Structural Aids

A fifth component that must be considered when selecting social studies material is the arrangement of structural aids, i.e., whether the material has a clear and concise ordering of subheads and an adequate introduction, summary, and glossary. For instance, the student should be able to discern the relationship between major and minor subheads. Figure 7 illustrates a clearly perceivable relationship between major and minor subheads; however, in Figure 8 the relationship is not easily recognizable. The major subhead for this subsection is "Republicans Provide Conservative Government in the 1920s." It is hard to see how "The burdens of office prove too much for Harding" or "The public learns of scandal" are related to "Conservative Government in the 1920s." It is obvious that either the subheads should be subdivided into separate categories or new subheads which clearly indicate the relationship between the major and minor ideas in this section should be devised. The subhead arrangement should be an outline imposed upon the material which provides the reader with some clearly discernible indication of the interrelationship among ideas. The proper arrangement of subheads is an important facilitative aid in the comprehension process; it assists good as well as poor readers in imposing organizational structure upon the material, and this is an essential requisite to successfully comprehending printed information.

**Figure 7.—Meaningful Arrangement of Subheads**

Progressives Demand Reform
1. What were the sources of the Progressive movement?
2. Progressives object to rapid growth of monopolies
3. Progressives are disturbed by inequalities in American life
4. Journalists arouse public opinion
5. Other writers expose evil conditions
6. Radicals take advantage of widespread discontent
7. Socialists call for government ownership

Reforms Begin at City and State Levels
1. Aroused citizens act to end municipal corruption
2. New forms of city government introduced
3. Reformers tackle the state government
4. State government undergoes many changes
5. State legislatures pass social welfare laws
6. Women work for reform

**Figure 8.—Unorganized Presentation of Subheads**

Republicans Provide Conservative Government in the 1920s
1. Wilson's term ends in confusion
2. Two Constitutional Amendments are adopted
3. The parties nominate candidates
4. Harding is elected president
5. Harding appoints his cabinet
6. The burdens of office prove too much for Harding
7. The public learns of scandals
8. The Teapot Dome scandal involves Secretary Fall
9. Coolidge becomes a popular president
10. Coolidge wins the election of 1924
11. Republican Administration aids business
12. Taxes are lowered
13. Tariff rates are raised
14. Congress responds to the demands of veterans
15. Opponents of unrestricted immigration speak out
16. Congress establishes immigration quotas
17. Farmers suffer hard times
18. The "Farm Bloc" tries to improve the situation

Other structural aids that should be part of any textual material are a good introduction and summary. Both of these factors are especially important to students who have difficulty comprehending printed material. For example, prior to reading a selection the social studies teacher may wish to establish a purpose for reading. Utilizing the introduction and summary, the teacher can direct the students' attention toward those aids by having the student predict what information he or she believes the chapter will contain. One of the least productive procedures to utilize is to have students begin reading without a clearly focused purpose. Providing clearly focused reading instruction means more than merely saying to students, "For tomorrow please read the next section which deals with the rise of Hitler and the Nazi Party." Setting a purpose for reading has to be more explicit. Without a good introduction or summary, it is difficult to get students to engage in such tasks. Therefore, it is essential that books contain these structural aids.

### Summary

As this article has attempted to point out, there is no easy method for estimating the difficulty level of textual materials. The criteria proposed here do not lend themselves to a neatly developed formula which can be translated into a grade-equivalency score. However, they do suggest several variables (method of conceptual presentation, organization of concepts, questioning strategy, utilization of adjunct aids, and use of structural aids) which if not adequately developed in textual materials can impede



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the comprehension process just as easily as complex vocabulary and sentence structure can. The evaluative procedure must be systematic and thorough; no longer can important factors in the comprehension process be subjugated to lesser positions of importance. All the factors involved in making reading matter comprehensible must be considered when selecting textual material for classroom use.

## NOTES

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7. For a more detailed description of this approach to conceptual attainment see Charles Peters, "The Effect of Systematic Restructing of Material upon the Comprehension Process," *Reading Research Quarterly*, 11: 87-111.

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# THE TAXONOMY OF READING COMPREHENSION

by

Thomas Barrett

1.0 Literal Comprehension. Literal comprehension focuses on ideas and information which are explicitly stated in the selection. Purposes for reading and teacher's questions designed to elicit responses at this level may range from simple to complex. A simple task in literal comprehension may be the recognition or recall of a single fact or incident. A more complex task might be the recognition or recall of a series of facts or the sequencing of incidents in a reading selection. Purposes and questions at this level may have the following characteristics.

1.1 Recognition requires the student to locate or identify ideas or information explicitly stated in the reading selection itself or in exercises which use the explicit ideas and information presented in the reading selection. Recognition tasks are:

1.11 Recognition of Details. The student is required to locate or identify facts such as the names of characters, the time of the story, or the place of the story.

1.12 Recognition of Main Ideas. The student is asked to locate or identify an explicit statement in or from a selection which is a main idea of a paragraph or a larger portion of the selection.

1.13 Recognition of a Sequence. The student is required to locate or identify the order of incidents or actions explicitly stated in the selection.

1.14 Recognition of Comparison. The student is requested to locate or identify likenesses and differences in characters, times, and places that are explicitly stated in the selection.

1.15 Recognition of Cause and Effect Relationships. The student in this instance may be required to locate or identify the explicitly stated reasons for certain happenings or actions in the selection.

1.16 Recognition of Character Traits. The student is required to identify or locate explicit statements about a character which helps to point up the type of person he is.

1.2 Recall requires the student to produce from memory ideas and information explicitly stated in the reading selection. Recall tasks are:

1.21 Recall of Details. The student is asked to produce from memory facts such as the names of characters, the time of the story, or the place of the story.

1.22 Recall of the Main Ideas. The student is required to state a main idea of a paragraph or a larger portion of the selection from memory, when the main idea is explicitly stated in the selection.

1.23 Recall of a sequence. The student is asked to provide from memory the order of incidents or actions explicitly stated in the selection.

1.24 Recall of Comparisons. The student is required to call up from memory the likenesses and differences in the characters, times, and places that are explicitly stated in the selection.

1.25 Recall of Cause and Effect Relationships. The student is requested to produce from memory explicitly stated reasons for certain happenings or actions in the selection.

1.26 Recall of Character Traits. The student is asked to call up from memory explicit statements about characters which illustrate the type of persons they are.

2.0 Reorganization. Reorganization requires the student to analyze, synthesize and/or organize ideas or information explicitly stated in the selection. To produce the desired thought product, the reader may utilize the statements of the author verbatum or he may paraphrase or translate the author's statements. Reorganization tasks are:

2.1 Classifying. In this instance the student is required to place people, things, places, and/or events into categories.

2.2 Outlining. The student is requested to organize the selection into outline form using direct statements or paraphrased statements from the selection.

2.3 Summarizing. The student is asked to condense the selection using direct or paraphrased statements from the selection.

2.4 Synthesizing. In this instance, the student is requested to consolidate explicit ideas or information from more than one source.

3.0 Inferential Comprehension. Inferential comprehension is demonstrated by the student when he uses the ideas and information explicitly stated in the selection, his intuition, and his personal experience as a basis for conjectures and hypotheses. Inferences drawn by the student may be either convergent or divergent in nature and the student may or may not be asked to verbalize the rationale underlying his inferences. In general, then, inferential comprehension is stimulated by purposes for reading and teachers' questions which demand thinking and imagination that go beyond the printed page.

3.1 Inferring Supporting Details. In this instance, the student is asked to conjecture about additional facts the author might have included in the selection which would have made it more informative, interesting or appealing.

3.2 Inferring Main Ideas. The student is required to provide the main idea, general significance, theme, or moral which is not explicitly stated in the selection.

3.3 Inferring Sequence. The student, in this case, may be requested to conjecture as to what action or incident might have taken place between two explicitly stated actions or incidents, or he may be asked to hypothesize about what would happen next if the selection had not ended as it did but had been extended.

3.4 Inferring Comparisons. The student is required to infer likenesses and differences in characters, times, or places. Such inferential comparisons revolve around ideas such as: "here and there," "then and now," "he and he," "he and she," and "she and she."

3.5 Inferring Cause and Effect Relationships. The student is required to hypothesize about the motivations of characters and their interactions with time and place. He may also be required to conjecture as to what caused the author to include certain ideas, words, characterizations, and actions on his writing.

3.6 Inferring Character Traits. In this case, the student is asked to hypothesize about the nature of characters on the basis of explicit clues presented in the selection.

3.7 Predicting Outcomes. The student is requested to read an initial portion of the selection and on the basis of this reading he is required to conjecture about the outcome of the selection.

3.8 Interpreting Figurative Language. The student, in this instance, is asked to infer literal meanings from the author's figurative use of language.

4.0 Evaluation. Purposes for reading and teacher's questions, in this instance, require responses by the student which indicate that he has made an evaluative judgment by comparing ideas presented in the selection with external criteria provided by the teacher, other authorities, or other written sources, or with internal criteria provided by the reader's experiences, knowledge, or values. In essence evaluation deals with judgment and focuses on qualities of accuracy, acceptability, desirability, worth, or probability of occurrence. Evaluative thinking may be demonstrated by asking the student to make the following judgments.

4.1 Judgments of Reality or Fantasy. Could this really happen? Such a question calls for a judgment by the reader based on his experience.

4.2 Judgments of Fact or Opinion. Does the author provide adequate support for his conclusions. Is the author attempting to sway your thinking? Questions of this type require the student to analyze and evaluate the writing on the basis of the knowledge he has on the subject as well as to analyze and evaluate the intent of the author.

4.3 Judgments of Adequacy and Validity. Is the information presented here in keeping with what you have read on this subject in other sources? Questions of this nature call for the reader to compare written sources of information with an eye toward agreement and disagreement or completeness and incompleteness.

4.4 Judgments of Appropriateness. What part of the story best describes the main character? Such a question requires the reader to make a judgment about the relative adequacy of different parts of the selection to answer the question.

4.5 Judgments of Worth, Desirability and Acceptability. Was the character right or wrong in what he did? Was his behavior good or bad? Questions of this nature call for judgments based on the reader's moral code or his value system.

5.0 Appreciation. Appreciation involves all the previously cited cognitive dimensions of reading, for it deals with the psychological, and aesthetic impact of the selection on the reader. Appreciation calls for the student to be emotionally and aesthetically sensitive to the work and to have a reaction to the worth of its psychological and artistic elements. Appreciation includes both the knowledge of and the emotional response to literary techniques, forms, styles, and structures.

5.1 Emotional Response to the Content. The student is required to verbalize his feelings about the selection in terms of interest, excitement, boredom, fear, hate, amusement, etc. It is concerned with the emotional impact of the total work on the reader.

5.2 Identification with Characters or Incidents. Teachers' questions of this nature will elicit responses from the reader which demonstrate his sensitivity to, sympathy for, and empathy with characters and happenings portrayed by the author.

5.3 Reactions to the Author's Use of Language. In this instance, the student is required to respond to the author's craftsmanship in terms of the semantic dimensions of the selection, namely, connotations and denotations of words.

5.4 Imagery. In this instance, the reader is required to verbalize his feeling with regard to the author's artistic ability to paint word pictures which cause the reader to visualize, smell, taste, hear, or feel.

# The ivory tower connection: A case study

JAMES W. CUNNINGHAM
ESTHER OAKES FOSTER

*Through the work of a translator, a deducer, and an applier, results of research can find their way very quickly into ordinary classrooms.*

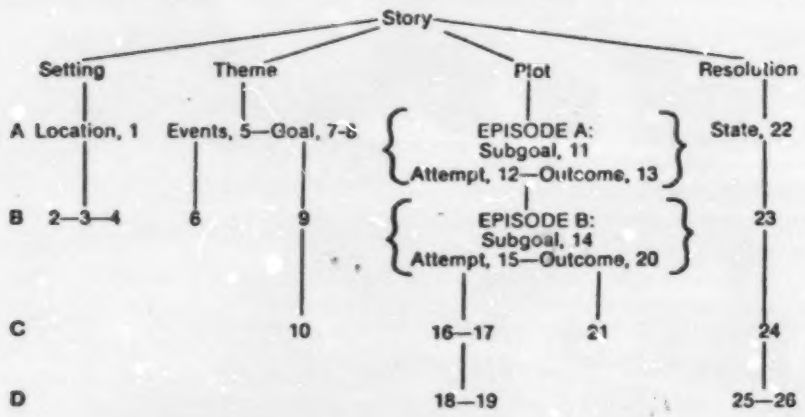
PRETEND you are an educational detective. First, you are given a series of related events to contemplate; then, you are asked to solve the mystery of "The Ivory Tower Connection."

*January 1977.* Two articles on story comprehension appear in the research journal *Cognitive Psychology* (Thorndyke 1977, Mandler and Johnson 1977). Both articles report research concerning the idea that stories have an overall plot structure or "story grammar." It is suggested that if readers (or listeners) come in contact with enough stories, they internalize this story grammar. These readers (or listeners) can then use this internalized story grammar to help them understand and remember a new story by anticipating and recalling basic structural elements of the plot.

*February 1977.* John Guthrie's (1977) monthly column in *The Reading Teacher*, "Research Views," contains an explanation of story grammar and its implications for story comprehension. (Although the January 1977 issue of *Cognitive Psychology* had not appeared when Guthrie was preparing his column, he had learned of Thorndyke's work in an address by Thorndyke's professor, Gordon Bower, at a psychological convention, and he had learned of Mandler and Johnson's work from preprints of their articles.) A major part of Guthrie's discussion centers on specific rules of story grammar postulated by Thorndyke. Guthrie explains (p. 575):

> The first rule simply defines a story as consisting of a setting, theme, plot, and a resolution, which usually occur in that sequence. The second rule is

**Figure 1**




that the setting consists of characters and usually the location and time of a story. The third rule is that the theme of a story consists of the main goal of the main character.... The plot of a story consists of a series of episodes, which are designed to help the main character reach his goal. Each episode consists of a subgoal, an attempt to reach the goal, and a resolution of the attempt.... After several episodes, an outcome occurs which matches the goal of the main character, ushering in a final resolution. These rules apply to many stories, folk tales and dramas, and give us a common framework for understanding them.

To illustrate his explanation of story grammar, Guthrie includes a diagram (Figure 1).

*February 28, 1977.* The Monday class of Dr. Cunningham's graduate reading course has just ended. Ms. Foster, a sixth grade teacher enrolled in the class, waits afterward to ask another in her long series of tough, practical questions. This conversation is overheard:

Foster: I have one reading group which has finished a book and I can't find another interesting book for them that is at the right level. Is there some way I can use the Sprint novels [Shepard 1974] with this group?

Cunningham: Do you have enough books for each student to have a copy of the novel you're using?

F: Well, I thought I could have each one reading a different one. Is that possible?

C: If you had a study guide for each book that the student could fill out while he read it....The problem with that is you have to take all the time to make one up for each book. What you need is a general enough study guide so that it works for all stories.

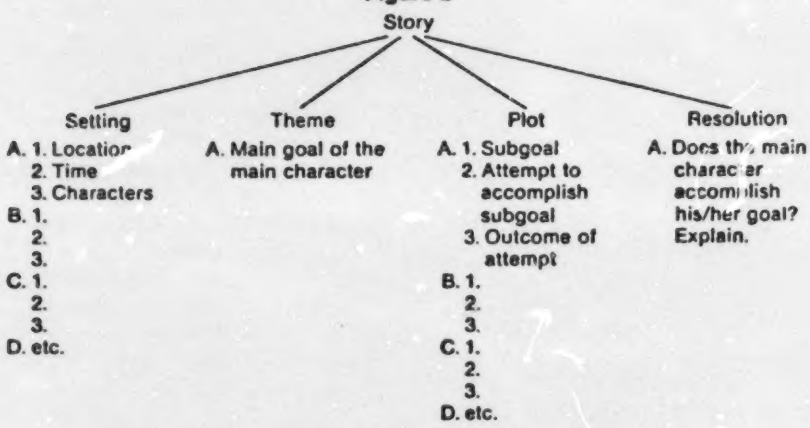
F: Can such a thing be done?

C: [An epiphany occurs.] You know what? It's already been done. There's an article in the February *Reading Teacher* about a story schema. I'll go down to my office and get it to show it to you. [He leaves and returns shortly with a journal.] Here it is. [He shows her the diagram in Guthrie's column.]

F: What is it?

C: These guys have figured out what most stories have in common and have come up with a structure which has a slot left open for each common element. For every story you would fill in each slot differently, but every story would have something to go in each slot. And it is what goes in these slots from a story that makes it a story.

**Figure 2**




Why couldn't you use this diagram and have a student fill in the slots from the story he was reading as he went along?

F: My students wouldn't know what some of those words mean that are used in the diagram.

C: If I loaned you this *Reading Teacher*, could you make up a diagram that used words they would understand and which would leave them space to write in the element that belonged in each slot?

F: I could try.

C: Do you want to try it?

F: Sure. If it doesn't work, I'll just have to do something else. Should I give it to them and explain the terms or what?

C: No, I guess you really need to teach them the schema first. Use some easy stories and put the chart you make up on the board and fill it in as a group.

F: Don't worry; I won't lose your journal.

That night at home, Ms. Foster prepared to teach the story schema teaching technique they had developed from Guthrie's diagram that afternoon. She made a simplified version of the diagram and copied it onto a duplicating master so that each student could have a copy.

Her simplified diagram looked like Figure 2.

After the diagram was completed, Ms. Foster sat for a few minutes to think of the best way to use it. She recalled that Guthrie had used as an example a story of a knight trying to rescue a lady in distress. She decided to use that same example for her reading group. Then she and the group would fill in the diagram for one or two stories in the *Action* short story book, *The Fallen Angel and Other Stories* (Cebulash 1970).

Tuesday morning, Ms. Foster started her other sixth graders on their reading assignments, then called the "Fallen Angel" group together. She drew the diagram on the chalkboard and distributed the duplicated sheets to the group members. Before she had a chance to speak, Kenneth asked, "Are we going to have to do something with that?"

"Yes, you are," she replied.

"But I don't know what all of them words mean," complained Kenneth.

"I know you don't know *all* of them, but after I explain them, you'll know what they mean."

"Is this something your professor told you to do with us?" asked Thomas.

"Well, he didn't tell me to do it, but

he did suggest that I might try it."

"It looks hard," said Sarah.

Ms. Foster noted the group's resistance to something new, then told them that it would be clearer once she gave them an example. She proceeded to tell the story of the knight rescuing the lady and filled in the diagram on the board as she went along. Several students commented that they understood a little better, and Ms. Foster proceeded to do the first story in the short story book. All of the students read along silently as Ms. Foster read the story aloud. As she read a page, she filled in the diagram on the board.

By the time she reached the third page of the first story, some students were joining her in choosing answers. She then shifted the procedure by saying, "Okay, who are the characters in this part of the story?"

Several students answered correctly.

"Has the location changed?" she asked.

Several students answered, "Yes."

She then proceeded through the remainder of the story in this manner. Throughout the session she noted that the plot created the most difficulty, whereas the setting was clearly the easiest; the theme and resolution offered no real trouble.

Ms. Foster explained to the students that when they had completed the diagram, they would have the important parts of the story listed and would need to know only those parts to understand the story. She then had the students pair up and do the next story themselves on their sheets, while she moved among them, helping when necessary. Again she noted that the most trouble was with the plot.

*March 14, 1977.* Cunningham's Wednesday class ends and Ms. Foster heads for the door.

Cunningham: Esther, how did that story schema technique work out?

Foster: They're finally able to do fairly well on the short stories.

C: Tell me about what you did.

F: I used Guthrie's example of the knight and the lady in distress and filled in my simplified diagram on the board.

C: Could they follow what you were doing?

F: Somewhat, but they didn't see how you could do it with a written story until we used the book.

C: Well, I hope you did the first story with them.

F: I did. I read the story aloud while they followed along, and I filled in the diagram on the board.

C: Did they catch on?

F: They must have because they started helping me fill it in.

C: That's really good!

F: I thought I'd give them several more short stories and then use the *Sprint* novels. Do you think that's a good idea?

C: I think that's fine.

### The mystery

At first glance, the mystery of "The Ivory Tower Connection" would seem to be "how a piece of pure research, published in a noneducational journal in January, came to be applied in the classroom with rural North Carolina sixth graders in March." But on reflection, the real mystery is "why it does not happen more often."

### The solution

It seems that educators have accepted the notion that there must be a long lag between the formulation of theory and basic research, and the application of that theory or research with students in classrooms. Such acceptance is manifest in the disdain of some theorists for teachers who "want recipes," and in the disdain of some teachers for theorists who "aren't practical."

We refute the necessity of such a lag in reading. Quality theory and model building and quality research with implications for understanding reading are being conducted in education, linguistics, literature, psychology, and sociology. What is needed are people to fill three roles: translator, deducer, and applier.

The translator must explain the theory, model, or research in terms the reading professor, director, supervisor, or teacher can understand. In turn, some of these professors, directors, supervisors, or teachers must deduce teaching strategies which follow from these more readable "second sources." These new teaching strategies must then be applied in the classroom by a teacher to make "The Ivory Tower Connection" complete.

Translators reduce the lag when, as Guthrie did in our case, they learn of the theories of research in advance of their publication. Deducers reduce the lag when, as Cunningham and Foster did in our case, they develop teaching strategies which are true to both the integrity of the translation and the reality of the classroom. Appliers reduce the lag when, as Foster did in our case, they try the new strategy with students who seem to need it, without thinking of reasons in advance why it probably won't work.

*You* can fill one or more roles in your own "Ivory Tower Connection."

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**Board of Directors endorses balanced skills approach**

The Board of Directors of the International Reading Association endorsed the following policy statement at its April 1977 meeting:

Word analysis skills, including phonics, are critical to learning to read. However, IRA cannot support the position that reading instruction is defined primarily in terms of such skills. Effective instruction must account for word analysis as a means to the larger end goal of meaning and application. IRA also strongly encourages emphasis on instructional areas such as the development of comprehension abilities, high quality literature experiences, positive attitudes toward self and reading, and content area literacy skills. Instructional programs across the grade levels should incorporate word analysis skills and instructional areas such as those above in balance to meet the instructional and recreational reading needs of the individual student.



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# Use the ConStruct Procedure to foster active reading and learning

Joseph L. Vaughan, Jr.

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The teacher responded, "But my students can't understand, much less remember, what they read." Too many secondary school teachers voice this concern with too much frequency for this comment to be out of the ordinary.

The problem expressed is that adolescents often have excessive difficulty as they try to comprehend complex expository texts such as those in biology, government, health, or power mechanics. This article examines the nature of this problem and shares a strategy that enables readers to comprehend complex expository texts better.

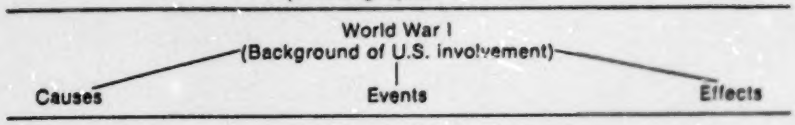
**The ConStruct Procedure**

The name ConStruct Procedure is derived from *con*cept *struct*uring. The strategy helps readers determine structures among concepts. It was developed in response to a need expressed directly by content teachers in various fields.

At the heart of this strategy is the degree to which it helps readers become more actively involved in a search for meaning. As Bransford (1979, p. 52) has so aptly indicated, "People do not operate like audio or visual tape recorders that passively store information; rather they must actively perform certain types of activities in order to learn." Nowhere is the importance of active involvement in learning more evident than when one reads material that is new, complex, and filled with technical vocabulary.

The ConStruct Procedure integrates

**Figure 1**
**Top level graphic overview**




two dimensions of learning through reading. First is the notion of diversified readings. A student reads a complex expository selection three times, but each reading differs from the others. Note that nowhere in this discussion will you find the term "rereading." That is intentional; each reading is *different* and students must learn to perceive these differences and the purposes associated with each reading.

The second dimension of the ConStruct Procedure is the construction of a graphic overview that depicts the relationship among the concepts presented in the selection. This diagram is constructed in stages following each of the three readings. While others have called this form of graphic depiction a structured overview (e.g., Herber, 1969), a post-graphic organizer (e.g., Barron, 1980) or, in an extended form, a semantic map (e.g., Pearson and Johnson, 1978), I chose graphic overview as being more descriptive and because the other terms have come to mean various things to different people.

Let me describe the procedure. Examples are based on an eighth grade American social studies selection.

Initially, a student reads the selection very rapidly (survey-reads) to obtain an overview of its content. The student should use all available information that lends itself to this task, such as titles, subtitles, introductory paragraphs, first sentences, summaries, pictures, maps, and diagrams. After this survey of the selection, the reader constructs the general framework for a graphic overview. This first stage of the graphic overview should include only the major topic and its most outstanding subheadings. It may resemble the one in Figure 1. The purpose for including the main idea (background of U.S. involvement in World War I) along with its major subparts (causes, events, effects) is that these concepts are the essence of the entire selection.

The second phase of the ConStruct Procedure consists of a careful "study-type" reading of the selection followed by elaboration upon the graphic overview. During this second reading, the reader is directed to seek to understand, not to remember. Because the focus here is on understanding, readers are advised to "note, but don't worry about" those sections they may not understand (they will return to those later) *and* to pay attention to details primarily for the purpose of understanding them instead of memorizing or remembering them. Either during this second reading or immediately after it, the reader adds to and elaborates upon the first stage of the graphic overview; when to do this is left to the discretion of individual students. Figure 2 shows an extension of the graphic overview from Figure 1.

During the third phase of the ConStruct Procedure, the reader should first reexamine any segment of the selection that was previously not understood. Sometimes readers will discover that, because they have increased their understanding of the

complex, expository texts; ideas were often listed one after another with little indication of how they were related. (Similar observations have been reported in some depth by Deese et al., 1980, and Tierney and Mosenthal, 1980.)

A third feature of texts contributed substantially to the decision to use three readings in ConStruct. Most selections assigned to students at any one time contained three distinct layers of concepts: a main idea that ran through the entire selection, several subordinate ideas that served as major ideas of subsections (e.g., causes, events, effects), and numerous specifics that usually sought to clarify or elaborate upon the subordinate ideas. Although these three conceptual levels could almost always be identified, extensive searching was often required to find them because the texts themselves failed to identify or relate these conceptual levels clearly to one another.

*Readers.* Given our observations about the texts, discussions with students provided substantial insights into the problem. Specifically we identified five characteristics that deserve mention. First, these adolescent readers tended to read all types of materials in essentially the same way. They began with the first word and read through to the last. Second, they expected to understand and remember the information from a single reading. Few made any distinction between efforts to understand and efforts to remember. Third, the students believed that to remember you must memorize details and definitions, because that is what teachers test. Fourth, these readers had little conscious awareness of the structure of expository text; they read complex exposition in the same way they read narration because they did not perceive the two as being different. Fifth, these readers seemed to make little effort to understand concepts in relation to one another. They saw concepts as isolates. These readers simply could not insert the implicit links and ties that are required for comprehension because they lacked so much awareness about the concepts and the text structure.

*Reader-text context.* A major contributor to students' difficulty in understanding content texts was their teachers' failure to recognize the complexity and inherent flaws in those texts. As specialists familiar with the ideas presented, and capable themselves of inserting all the missing links, the teachers did not recognize either the complexity or the flaws until these were called to their attention. Further, the teachers rarely provided any prereading instruction for the students that could have facilitated the students' comprehension. Typically, teachers assigned reading selections as the initial study activity; discussion or lectures usually followed students' reading and were based on teachers' expectations that the students understood and remembered what they read. The teachers' frustrations evolved as they realized that their assumptions were invalid.

### Learning principles

The solution to the problem was derived from our clearer understanding of the problem itself. It took its final form as we related several important learning principles to readers' needs.

First, prior knowledge is a key determiner of understanding new information. Innumerable authorities

have said this but perhaps none so precisely as Ausubel (1978, p. iv), "If I had to reduce all of educational psychology to just one principle, I would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly." The message to teachers should be clear: For students who are to read complex expository text that contains extensive unfamiliar content, prereading instruction is essential.

What, though, of the learner who must read such material without the benefit of a teacher who has gotten the message? Such learners are still expected to comprehend the text with little or no prior knowledge. The ConStruct Procedure seeks to provide for this common situation by encouraging the reader to use the strategy of three differentiated readings. By examining a text in the three ways described, a reader can diminish the effect of a limited background of information. That is, by surveying the material, then reading to understand it, then reexamining information that was not clear on first encounter, and finally by scanning for important details, a reader can gradually absorb information about the topic and fill in gaps in prior knowledge.

A second important learning principle applied in the ConStruct Procedure is that concepts are best understood in relation to one another. By reading for understanding and by constructing a graphic overview, the reader actively clarifies the relationships among concepts and thereby facilitates an understanding of specifics.

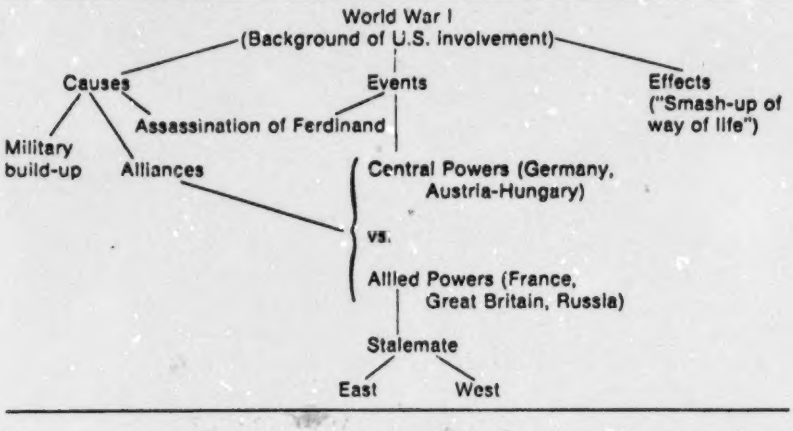
The third learning principle on which ConStruct is based is that understanding precedes remembering. The strategy facilitates recall because it fosters understanding. Efforts at recall do not become anxious endeavors at memorization; recall happens more naturally as a result of clear understanding. Further, construction of the graphic overview reinforces and adds to the recall of concepts and their relationships.

**Research validation**

Limited investigations have confirmed that the ConStruct Procedure significantly enhances readers' factual and inferential comprehension of extended expository text. Further, this strategy increases readers' understanding and delayed recall of information at all three conceptual levels as described earlier. Vaughan, Stillman, and Sabers (1978) reported that when readers who used the ConStruct Procedure were compared to those who did not, those who did had significantly better recall ($p < .01$) of the selection. Vaughan, Taylor, and Meredith (1980) found that the two dimensions of the ConStruct Procedure contributed to the improvement in comprehension and recall of those in the experimental groups. The three readings contribute primarily to inferential comprehension at all three conceptual levels; construction of the graphic overview contributes primarily to factual comprehension. In neither of these studies was a difference found in the reading rates of the control and experimental groups.

Several research studies suggest that an awareness of the organization and relationships among concepts in expository text, as fostered by ConStruct, facilitates understanding and recall. Meyer (1975) reported that

**Figure 2**
**Second stage graphic overview**




topic by continuing through the second phase of the strategy, their newly developed "prior knowledge" will enable them to understand something that was previously unclear. If this occurs, the reader should insert the clarified concepts into the graphic overview where they fit. The reader should then scan the selection to identify detailed information that should be included in the graphic overview, and those details should be added as they are identified. The final version of the graphic overview might resemble Figure 3.

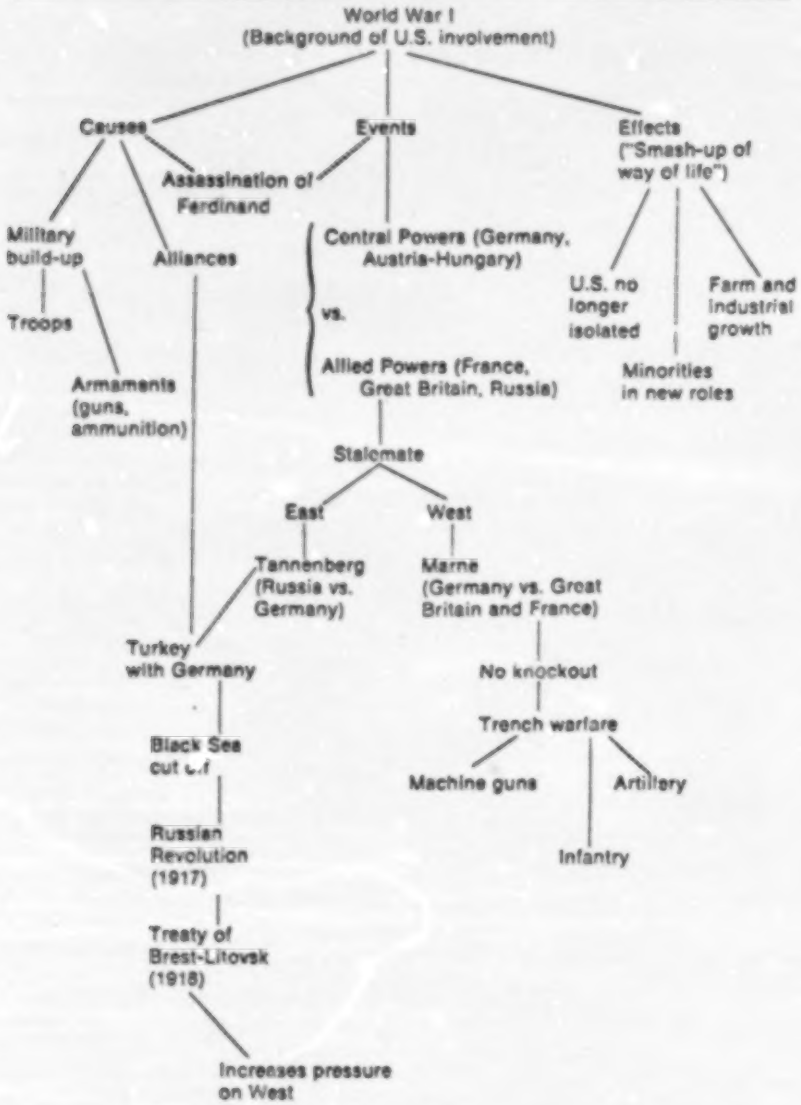
The final step in the ConStruct Procedure, an extension of the third phase, involves the reader's skimming over the entire selection and examining the completed graphic overview to reinforce understanding and to facilitate recall of the concepts and their relationships.

## Background

The specific elements incorporated into the ConStruct Procedure were largely determined by the nature of the problems that students face when reading complex content materials. In all reading, three primary factors contribute to comprehension or its lack: the text itself, the readers, and the context of the reader-text interaction. When each factor was examined in relation to content area reading, several sources of difficulty emerged, and the ConStruct Procedure was designed to help students compensate for them.

*Texts.* The texts themselves were a major contributor to the problem for several reasons. First, and most obvious, was the concept load in this type of material. Most of the ideas presented were new to the readers and highly complex at that. The vocabulary is invariably technical and precise. Perhaps the technical vocabulary would be an asset if terms were introduced after the readers had a chance to understand the concepts, but the terms are used to describe and explain the concepts. One member of the group analyzing these texts noted, "It's almost as if these books were written to impress colleagues rather than help students learn."

**Figure 3**
**Completed graphic overview**




The second problem is most accurately described as a failure by authors to relate concepts to one another in a clear and cohesive way. This lack of cohesion meant that the readers were left on their own to insert important links and ties among concepts. The redundancy that often contributes cohesion and coherence to text was also missing in these

readers tend to recall generalizations better than specifics. Taylor (1979-1980) found some inconsistencies that appear to be related to readers' awareness of text structure and conceptual relationships. The studies by Vaughan, Stillman, and Sabers and Vaughan, Taylor, and Meredith found that good readers in the control group did tend to recall generalizations better; average or below average readers tended to recall specifics rather than generalizations, at least when they read complex, extended, expository text. One explanation for this may be that good readers seek to understand generalizations rather than details, hence that is what they recall. Less able readers try to memorize specifics to pass teachers' tests, so they remember specifics, at least momentarily, rather than generalizations.

Taylor (1979-1980, pp. 410-11) noted that research should investigate "instructional techniques which will help children develop skills in noting and using the organizational structure of expository text to enhance their learning-from-reading." That is the purpose of the ConStruct Procedure. In those cases where this procedure has been investigated, students who have learned to use it have substantially increased their comprehension of problematic text. Further investigations are in progress to determine the effect of this strategy with less complex text, with narrative text, with upper elementary readers, and with increased numbers of students of different reading ability.

### Instructional suggestions

A primary feature of the research to date on the ConStruct Procedure has been its context. All these studies have been pursued to determine whether the strategy can be learned and used in regular classrooms. Anyone planning to teach this strategy will want to consider the following suggestions based on classroom observations.

*1. Teach ConStruct in context.* ConStruct is intended for and has been validated with readers who have difficulty comprehending complex, extended, expository text. Students should learn to use ConStruct by applying it when reading their regular textbooks in their regular content classes. Although this initially requires the use of class time for students to read what would usually be homework assignments, teachers who have been willing to do so have reacted favorably. Many students learn the strategy and increase their understanding of these texts when they later return to reading their assignments outside of class. Further, even while learning to use ConStruct, students are more attentive to and involved in discussion of content because they understand what they are studying. Hence, teachers often report that time is actually saved, even during the instructional period for the strategy, because information does not have to be repeated.

*2. Explain what you are doing.* In those instances where we have told students that we realize they are having trouble understanding and remembering what they read in their textbooks, they are relieved to hear that someone knows and cares. When we were less than honest about what was going on, we encountered resistance from many students, especially successful ones, because they were reluctant to abandon strategies that were comfortable and familiar.

*3. Be patient.* The optimum period for students to learn and to become adept at using the ConStruct Procedure is 10 weeks with two sessions per week. Some students will learn more quickly than others, so patience is very important.

*4. Model the graphic overview.* Graphic overviews are a crucial dimension of the ConStruct Procedure, but few students have been exposed to them. Before you actually introduce your students to ConStruct, you may find it beneficial to design some graphic overviews on the board as part of class discussions. The value of such modeling cannot be overemphasized. Because students see the product of their thinking as it grows, they understand the construction process better. This facilitates their learning the ConStruct Procedure when it is later introduced.

*5. Involve students during modeling.* As an extension of item four, include students' ideas and input relative to the content and the location of the content in the graphic overviews you construct prior to introducing the ConStruct Procedure. As Moore and Readence (1980) noted, student involvement is the only feature that makes an activity of this sort a valuable contribution to students' comprehension. In fact using graphic overviews without student participation is likely to have little value, and you would do better to avoid them altogether until they are introduced as part of the procedure itself.

*6. Introduce ConStruct as an integrated strategy.* Students must understand the whole of ConStruct before they begin to learn its parts. Because it is complex, students will need to learn the strategy gradually, but to avoid students' perceiving the parts separated from the whole, we have found it essential to describe the entire strategy from the outset. Then we relate the parts to the whole as we introduce each part. This continuous reference to the whole helps students integrate, adopt, and sometimes even modify ConStruct into their own study tactics.

When we fail to maintain a perspective of the whole, students seem to focus only on the part being introduced and some even tend to cease using those parts already learned. Gestalt psychologists' perspective may well apply to the ConStruct Procedure: the whole is greater than the sum of its parts. When students finally learn and apply ConStruct, the parts seem to disappear and blend appropriately into an interwoven approach.

Thus, the initial step when introducing students to the ConStruct Procedure should be to outline it for them in much the same way that it is presented at the outset of this article.

*7. Learning ConStruct is like building blocks, only starting at the top.* Several variations of teaching ConStruct have been tried, but one particular sequence seems to work best. In general, the greatest success results from a straightforward presentation of the parts in the order in which they are actually used when the integrated whole is applied. The specific sequence is as follows.

7a. As an introduction, teach students why and how to survey a selection. Few students understand the value of a survey reading; even fewer know how to do it correctly. Of course, surveying strategies vary depending upon what "overview cues" a text provides. We have had

most success with a discovery approach rather than with giving explicit directions for a given selection. Following a survey of each selection, we first discuss students' responses to the question, "What will the selection be about?" Then we engage students in a discussion of what they did when they surveyed and why. Sharing their successes, students learn new ways to survey from each other.

7b. Second, begin overview construction with top-level content only. After students have been exposed to graphic overviews and surveying, we simply ask each student to design a top-level graphic overview for a selection they have just surveyed. To help students overcome any initial consternation, we encourage them to return to the text. We also walk around the class providing encouragement and reinforcement.

After students have designed their own top-level graphic overview, we ask one student to put his/her overview on the board. We discuss it and emphasize that it is one way, certainly not the only way, to depict the general concepts. After discussion, we ask the students to read the selection carefully. As they do, we examine the other students' top-level overviews. When we discover one with a different perspective from the one on the board, we ask the student to share it with the class after everyone has concluded their careful reading.

During this sharing session, the class, which has now read the selection carefully, can discuss the different examples of top-level overviews and may well conclude that some are more appropriate for the selection than the one originally discussed. This activity encourages students to revise their own top-level overviews on the basis of increased understanding of the selection. When they are using ConStruct later on their own, they should not feel "locked into" their first version.

7c. Third, encourage reading to understand, not to memorize. Students should be encouraged to stop trying to memorize and to focus their attention on understanding. This could be done during the general introduction of the procedure or even earlier as a tactic to be used apart from this strategy. The latest it should be introduced is when they "read carefully" after a discussion of a top-level graphic overview. At the same time, students should be encouraged to identify those sections of the text that they do not understand.

7d. Following "careful reading," second stage graphic overviews should be developed as an extension of top-level overviews. While teaching ConStruct, we have never ignored or deemphasized the course content. Even in the initial stages, students discuss the content of each selection after their "careful reading." Since we expose students to graphic overviews prior to introducing the ConStruct Procedure, we can very naturally elaborate on the top-level graphic overview that is already on the board during class discussion following each "careful reading."

We do, however, avoid adding details to the second stage graphic overviews. This is done because sometimes students cannot distinguish between details and main ideas of subsections. They try to include numerous details in the second stage graphic overviews before they perceive how those details are related to

subordinate concepts. Just telling students to shift their focus from details to main ideas of subsections isn't enough. It isn't that easy to do, for one thing, and, besides, the person who is telling them to shift focus is the same person who has been testing details. Their hesitancy based on experience is understandable.

Students should begin developing their own second stage graphic overviews gradually. We suggest two steps. First, before students try this on their own, you should elaborate on the top-level graphic overview on the board. Again, be sure to involve students in this discussion of where items go in the overview and why. Encourage students to refer back to their books to clarify suggestions. During this discussion, postpone inclusion of details that should be added later; this helps students realize the distinction between subordinate main ideas and details. After several sessions of group construction of the second stage graphic overview, students are usually prepared for the second step: designing their own second stage graphic overviews. Remind them, though, that their second stage graphic overviews are only a part of the whole.

7e. Fifth, help students learn to scan. The third reading in ConStruct has two purposes. The first is to try to understand any section that was previously unclear. Students are often amazed that they understand concepts when they examine them a second time. Students may need some help scanning the text to identify previously unclear sections unless, of course, they marked those sections during the earlier reading. The second purpose of the third reading is to identify details that will be inserted into the graphic overview. To do this well, students need to apply scanning skills.

7f. Finally, students insert details into the graphic overview. Details are much better understood and remembered when perceived in relation to other details and to more general concepts. Students have little difficulty accomplishing this final step if all before has gone as it should. At this point, teachers should bear in mind that it is often difficult to distinguish between a detail and a main idea of a subsection, especially given the way these concepts are often presented in texts. We try to avoid quibbling over indistinguishable distinctions. If a "detail" fits, it fits; if it doesn't, it doesn't. We usually leave it to the student to decide, especially after the student has become reasonably proficient with the ConStruct Procedure.

*8. Encourage practice, sharing, and discussion.* Once students have learned ConStruct, perceive it as an integrated strategy, and can apply it comfortably, practice is essential. This can be encouraged by continuing to allow class time for practice even after students seem to have become adept. After a reasonable period of use, students should be encouraged to discuss their problems and successes with the class so that "bugs" can be worked out, particularly if a variation in text is being introduced (e.g., one that does not have subheadings). We have found it helpful to allow students time at the beginning of class to discuss homework in small groups, including what they have learned, how they designed their graphic overviews, and what they may not understand.

## Independent learners

The ConStruct Procedure helps readers become more active in their search for meaning in complex, extended, expository text. Those students who have learned to use it adeptly have found new interest and success in many of their content area subjects. When students learn to use it through practice, they become independent learners in the truest sense. ■

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# Learning to Learn: On Training Students to Learn from Texts

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The general theme of this paper is how we can devise instructional routines to help students learn to learn. The dominant questions which have motivated training studies in developmental psychology are: can we improve upon students' spontaneous performance, and can we enhance their ability to perform future tasks of the same kind? Training studies aimed at improving students' academic performance can succeed by adding substantially to the students' knowledge; or they can succeed by instructing students in ways to enhance their own knowledge (i.e., in promoting learning to learn activities). It is this latter outcome that we now think is most desirable. A historical review of training studies in developmental research will provide a framework within which to place our recent research. Consideration will be given to the shift in emphasis from a concentration on instruction aimed at improving student performance per se to the current emphasis on instruction aimed at improving students' self-control and self-awareness of their own learning processes.

Historically, training studies in developmental research have aimed at inculcating deliberate strategies for promoting recall of information. But rote recall, although valuable, is not the only desirable outcome of learning activities. Often we want to enhance students' ability to understand the significance of the material they are learning rather than to improve their ability to recall it. Activities that promote recall need not necessarily be optimal for promoting other learning outcomes. Because of the dominance of deliberate memory strategies in training research, we will begin with a brief consideration of this literature and then proceed to discuss training aimed at bringing students to understand the significance of learning strategies, particularly in relation to school tasks such as studying texts.

## Strategies of Rote Recall

The most commonly studied strategies of rote recall are rehearsal, categorization and elaboration, and a great deal of research has been conducted to examine the developmental progression in the acquisition of these strategies. Rehearsal, repetition of items to ensure their memorability, is an activity that can be carried out on material that has no inherent meaning, such as a phone number. It can be, and often is, a brute force approach that does not demand any understanding of the significance of the material being processed. The learner is required merely to repeat segments of material until they can be rote recalled. Categorization as a strategy to enhance recall demands that any categorical organization inherent in the material be familiar to the learner and be used to design a plan for learning. Elaboration is a strategy whereby the learner imposes meaning or organization on material to render it more comprehensible.

The degree to which active transformation of the material is required, and the degree to which it is necessary to introduce, refine or combine elements of different strategies, determines the age of initial use and developmental trajectories. In general, however, the emergence of such strategies tends to be dependent on the degree and recency of formal schooling. In schooled populations, they emerge in a recognizable form between five and seven years of age and continue to be tuned and refined throughout the school years. Also common to the developmental course of these strategies is an intermediate stage called a production deficiency, where the child does not produce the strategy spontaneously but can be prompted or instructed to do so quite readily. Training studies in developmental research were initially aimed at examining the intermediate stage of production deficiencies for a variety of theore-

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tical reasons. In some cases, however, the aim was to help younger or slower children produce strategies that they would rarely come to produce spontaneously (Brown, 1974; Brown & Campione, 1978), and it is these "instructional" studies that we will consider next.

### Training Rote Recall Strategies

To simplify a very extensive literature, there are three types of training which have been attempted. The first group, and by far the most heavily populated, is the *blind training* study. By this we mean that students are not active conspirators in the training process. They are induced to use a strategy without a concurrent understanding of the significance of that activity. For example, children can be taught to use a cumulative rehearsal strategy by initially copying an adult, but they are not told *explicitly* why they must act this way or that the activity helps performance or that it is an activity appropriate to a certain class of memory situations, not just this particular task and setting. In the task of free recall of categorizable materials, children can be tricked into using the categorical structure by clever, incidental, orienting instructions (Murphy & Brown, 1975), or the material can be blocked into categories (Gerjuoy & Spitz, 1966), or recall can be cued by category name (Green, 1974); but the children are not told why, or even if, this helps recall. In elaboration tasks, children can be induced to provide an elaborated encoding of a pair of unrelated items, but they are not informed that this activity can be an effective learning strategy (Turnure, Buium, & Thurlow, 1976). All of these tricks lead to enhanced recall because the children are producing an appropriate activity. They fail, however, to result in maintenance of generalization of the strategy; that is, the children neither use the activity subsequently on their own volition, nor transfer the activity to similar learning situations. This is scarcely surprising as the significance of the activity was never made clear.

An intermediate level of instruction, *informed training*, is where children are both induced to use a strategy and also given some information concerning the significance of that activity. For example, children may be taught to rehearse and receive feedback concerning their improved performance (Kennedy & Miller, 1976), or they might be taught to rehearse on more than one rehearsal task; that is, they are trained in multiple contexts so that they can see the utility of the strategy (Belmont, Butterfield, & Borkowski, 1979). In the categorization task, students may be given practice in putting items into category, *and* informed that this will help them remember, *and* cued by category on retrieval failure (Burger, Blackman, Holmes, & Zetlin, 1978; Ringel & Springer, 1980). These training packages result in both improved performance on the training task and maintenance of the activity by the child when faced with subsequent similar problems. There is some evidence of generalization, but so far the evidence has been very near; that is, the generalization task is very similar to the training task (Brown & Campione, 1978, in press).

The third level of instruction, *self-control training*, is the level where children are not only instructed in the use of a strategy, but are also explicitly instructed in how to employ, monitor, check, and evaluate that strategy. The number of studies that have employed this combination are few, but preliminary results do indicate that the strategy-plus-control training packages are the most successful at inducing not only enhanced performance but also transfer of training to appropriate settings (Brown & Campione, in press). We will illustrate this type of training with one study from our laboratory (Brown, Campione, & Barclay, 1979).

#### *Recall-Readiness Training Study*

We were interested in teaching mildly retarded, grade school children the simple skill of checking to see if they knew material sufficiently well to be tested. This is an essential prerequisite for effective studying and one that young children have difficulty understanding (Flavell, Friedrichs, & Hoyt, 1970). Therefore, we devised a simple task where we could make the self-checking demands of such studying activities quite explicit. The hope was that with the essential elements made clear in a simple situation, we could look for transfer to more complex, school-like learning tasks.

The simple training task consisted of presenting the students with a list of pictures, too long for them to recall without using some deliberate memory strategy. They were told to study the list for as long as they liked until they were sure they could remember all the picture names. Even given unlimited study time, performance was initially poor, with students terminating study rapidly, long before they could recall the items.

During the training portion of the study, children were taught strategies which could be used to facilitate their learning of the lists, along with the overseeing or monitoring of those strategies. The latter aspect of training was accomplished by employing strategies that included a self-testing component and by telling the children to monitor their state of learning. For example, two effective strategies are cumulative rehearsal and anticipation. Anticipation involves active attempts to recall an item before looking at it, and rehearsal involves repetition of a small subset of the list. These activities both act as an aid to memory and provide information about its current status (i.e., if the learner cannot anticipate the next picture in a list, this provides the requisite knowledge that the list, in its entirety, is not yet known).

There were two groups of trainees: The older children were approximately 11 years old with mental ages of 8 years; the younger children were 9 years old with mental ages of 6 years. The older children taught the strategies involving a self-testing component

improved their performance significantly (from 58 percent correct to almost perfect accuracy), whereas those in a control condition did not. These effects were extremely durable, lasting over a series of posttests, the last test occurring one year after the training had ended. The younger children did not benefit much from training. They improved their performance significantly only on the first posttest, which was prompted (i.e., the experimenter told the children to continue using the strategy they had been taught). In the absence of such prompts, they did not differ significantly from their original level of performance. Even though the younger and older children did not differ in their level of original learning, they did differ in how readily they responded to training.

Given the successful result of training for the older students, we examined whether they had learned any general features about self-testing and monitoring on the simple laboratory task which they could transfer to a more school-like situation, learning the gist of prose passages. The students were asked to read and recall several short stories commensurate with their reading ability. They were permitted unlimited study time and were asked to indicate that they were ready to risk a test only when they felt confident that they could recall the essential information. Students who had received training on the list-learning tasks outperformed untrained students on four measures of efficiency: (1) the total amount recalled, (2) the ratio of important material to trivia included in their recall, (3) time spent studying, and (4) overt indices of strategy use (such as lip movement, looking away, and self-testing, etc.). Training on a very simple self-checking task did transfer to the school-like task of studying texts. We believe that an effective technique for inducing the rudiments of mature studying behavior is to (a) simplify the task so that the basic rules can be demonstrated, (b) train an appropriate learning strategy, *and* (c) train the self-monitoring of that strategy.

From our early work with training simple learning strategies, we came to two general conclusions (Brown & Campione, 1978, in press): Children should be fully informed participants in any training enterprise (i.e., they should be helped to understand why they should be strategic and when it is necessary to be so), and they should be trained in the self-management of the strategies they must deploy. The degree of explicit training needed on any one task will depend on the starting competence of the children and their general speed of learning. For slower children, or those with little prior knowledge, it might be necessary to make each step explicit. This is usually the case with mentally retarded students (Campione & Brown, 1977). Brighter, better informed students tend to show faster learning and some spontaneous transfer, and, therefore, it is often not necessary to make explicit all the steps of learning and the need for transfer, and so forth. The degree to which it is necessary to make each step explicit is a measure of the child's zone of potential development or region of sensitivity to instruction. (See Brown & French, 1979, for a discussion of this Vygotskian concept.)

### Coming to Understand the Significance of One's Activities

Recall of information is often demanded in schools, both verbatim recall as in vocabulary tests and gist recall as when the student is required to reconstruct the essential meaning of a text. Developing strategies that aid recall of information is, therefore, a worthwhile activity. Recall of information, however, is not the only desirable outcome of learning, and strategies that promote recall of information are not always the most appropriate for enhancing other learning outcomes. For example, Nitsch (1977) found that different kinds of practice were needed to ensure that learners could remember the definition of concepts, as opposed to ensuring that they could readily understand new instances of the concepts. A similar finding was reported by Mayer and Greeno (1972) concerning the appropriate training for students learning the binomial distribution. Repeated practice in using the formula or rule led to very accurate performance on subsequent problems of exactly the same form as training, whereas training aimed at explaining the significance of the components of the formula led to somewhat less accurate rule use but far better performance on alternate statements of the problem class.

In order to design appropriate training, we need to analyze the question: training for what? Similarly, in order to become really effective learners, children must analyze the learning situation for themselves.

Effective learning involves four main considerations: (1) the activities engaged in by the learner, (2) certain characteristics of the learner including his/her capacity and state of prior knowledge, (3) the nature of the materials to be learned, and (4) the critical task. In order for the psychologist or educator to devise a training program, it is necessary to consider all four aspects of the learning situation. For example, consider learning from texts. Any strategy (learning activity) one might adopt should be influenced by the inherent structure of the text (its syntactic, semantic and structural complexity, its adherence to good form, etc.), the extent to which the text's informational content is compatible with existing knowledge (characteristics of the learner), and the test to which the learning must be put (critical task, i.e., gist recall, resolving ambiguities, acquiring basic concepts, understanding instructions, etc.). As psychologists, interested in understanding and promoting learning, we must appreciate the complex interactions implicit in this characterization of the learning situation, and we argue that this is exactly what the student must do. In order to become expert learners, students must develop some of the same insights as the psychologist into the demands of the learning

situation. They must learn about their own cognitive characteristics, their available learning strategies, the demands of various learning tasks and the inherent structure of the material. They must tailor their activities finely to the competing demands of all these forces in order to become flexible and effective learners. In other words, they must *learn how to learn* (Bransford, Stein, Shelton & Owings, 1980; Brown, 1980). As instructors our task should be to devise training routines that will help the student to develop the understanding of the learning situation. In principle, training can be aimed at all four points. In fact, the majority of studies have aimed at training strategies or rules for prose processing. We will again illustrate strategy training approaches with a series of studies from our laboratory concerned with helping students improve their summarization skills.

### Training Strategies for Summarization

The ability to provide an adequate summary is a useful tool for understanding and studying texts. For example, an essential element of effective studying is the ability to estimate one's readiness to be tested, and we dealt earlier with simple procedures for ensuring at least a primitive form of such self-testing (Brown, Campione & Barclay, 1979). A commonly reported sophisticated method of testing one's level of comprehension and retention and, therefore, one's preparedness for a test, is to attempt to summarize the material one has been reading. This is quite a difficult task for immature learners. After considering many examples of childrens' failures and experts' successes when summarizing texts, we identified six basic rules essential to summarization (Brown & Day, Note 1). These operations are very similar to the macrorules described by Kintsch and van Dijk (1978) as basic operations involved in comprehending and remembering prose.

Two of the six rules involved the *deletion* of unnecessary material; one should obviously delete material that is trivial. Grade school children are quite adept at this if the content of the material is familiar (Brown & Day, Note 1). One should also delete material that is important but redundant. Two of the rules of summarization involve the *substitution of a superordinate* term or event for a list of items or actions. For example, if a text contains a list such as "cats, dogs, goldfish, gerbils and parrots," one can substitute the term pets. Similarly, one can substitute a superordinate action for a list of subcomponents of that action, for example, "John went to London," for "John left the house," "John went to the train station," "John bought a ticket," and so forth. These rules are roughly comparable to Kintsch and van Dijk's generalization rules. The two remaining rules have to do with providing a summary of the main constituent unit of text, the paragraph. The first rule is *select a topic sentence,* if any, for this is the author's summary of the paragraph. The second rule is, if there is no topic sentence, *invent* your own. These operations are roughly equivalent to Kintsch and van Dijk's integration and construction rules.

These operations are used freely by experts (rhetoric teachers) when summarizing texts (Brown & Day, Note 1). Do less sophisticated readers realize that these basic rules can be applied? To examine the developmental progression associated with the use of the basic rules we looked at the summaries produced by students from grades 5, 7 and 10 and various college-aged groups. The youngest children were able to use the two deletion rules with above 90 percent accuracy, showing that they understood the basic idea behind a summary. For the more complex rules, however, developmental differences were apparent. Students became increasingly adept at using the superordination and select topic sentence rules, with college students performing extremely well. The most difficult rule, invention, was rarely used by fifth graders, used on only a third of appropriate occasions by 10th graders, and on only half of the occasions when it was appropriate by four-year college students. Experts, college rhetoric teachers, used the invention rule in almost every permissible case. But junior college students performed like seventh graders, having great difficulty with the invention rule and using only the deletion rules effectively.

We explained this developmental progression in terms of the degree of cognitive intervention needed to apply each rule. The easier deletion rules require that information in the text be omitted and the intermediate topic sentence rule requires that the main sentence contained in a paragraph be identified. The more difficult invention rule requires that learners supply a synopsis in their own words. It is the processes of invention that are the essence of good summarization, that are used with facility by experts, and that are most difficult for novice learners.

Encouragingly, these rules can be taught. In a recent doctoral dissertation, Day (1980) trained junior college students to apply the basic rules and to check that they were using the rules appropriately. The students were divided into two groups: "average" students with no reading or writing problems identified, and "remedial" students who, although of normal reading ability, were diagnosed as having writing problems.

Within each of the two groups, there were four instructional conditions that varied in how explicit the training was: (1) *Self-management:* The students were given general encouragement to write a good summary, to capture the main ideas, to dispense with trivia and all unnecessary words, but they were not told rules for achieving this end. (2) *Rules:* The students were given explicit instructions and modeling in the use of the rules. (3) *Rules plus self-management:* The students in the third group were given both the general self-management instructions of Group I and the rules instruction of Group II, but they were left to integrate the two sets of information for themselves (4)

*Control of the rules:* The fourth and most explicit training condition involved training in the rules and additional explicit training in the control of these rules, that is, the students were shown how to check that they had a topic sentence for each paragraph, to check that all redundancies were deleted, all trivia erased, and that any lists of items were replaced with superordinates. The integration of the rules and appropriate self-control routines were explicitly modeled for the students. The amount of time spent in training and practice was the same for each group.

We will give only selected outcomes of this complex study (for details, see Day, 1980). Prior to training, all students, regardless of ability grouping, deleted appropriately (above 90 percent accuracy) but had much more difficulty with the topic sentence rules of selection (25 percent) and invention (15 percent). Following several days of instruction, performance on the more difficult rules improved and there were clear effects of ability level. Training in the selection rule was effective in general, but for the remedial students, the most effective condition was the most explicit training. Training in rule use alone was an effective technique, but adding the general, self-management instruction did not provide any additional help. The poorer students were not able to integrate the rules and self-management instructions for themselves and needed explicit instructions in the control of the rules in order to bring their level of performance up to that of four-year college students. The average students, benefited more from all forms of training and were able to integrate the general, self-management and rule training for themselves; therefore, there was no difference between the two rules plus self-management conditions. This indicates that the more mature students derive greater benefits from training and need less explicit instruction than do less sophisticated trainees, even though they did not appear to differ on their initial performance prior to training.

The pattern was repeated with the very difficult invention rule; remember that even four-year college students used this rule on only 50 percent of appropriate occasions (Brown & Day, Note 1). The remedial junior college learners improved only with the most explicit instruction. The average learners benefited more from training than did the remedial students, but before their performance was brought up to the level of four-year college students, the most explicit instruction was needed; it took explicit training in using and monitoring the rules before the average junior college students performed at the 50 percent accuracy level set by four-year college students.

The general pattern of results is very similar to that found with the much simpler recall-readiness experiment described earlier. The students in the summarization training study (as in the recall-readiness study) did not seem to differ in terms of their original performance levels, but the average students benefited more from instruction than did the remedial students. For the more sophisticated students, training resulted in greater use of the rules, and this improvement was effected with less explicit instruction. For those students with more severe learning problems, training resulted in less improvement and more explicit training was needed before there were any results of training. The extent of instruction needed to bring about improvement is a sensitive measure of the students' zone of potential development in the training domain, that is, we learn a great deal about students' competence by assessing not only their starting level but their readiness to benefit from instruction (Brown, in press a; Brown & Campione, in press; Brown & French, 1979).

### Helping Students Learn to Learn from Text

The two sets of studies used as illustrations, the recall-readiness (Brown, Campione, & Barclay, 1979) and summarization (Day, 1980; Brown & Day, Note 1) training studies, were selected because they are excellent examples of what we can do readily and what we have more difficulty in accomplishing. For example, with detailed task analyses, experts' advice and intensive training, we were able to help remedial college students improve their ability to summarize texts. But the texts were very easy for them, that is, they were texts of fifth-grade readibility level and were focused on familiar contents. Therefore, instructions to delete trivia met with compliance. If the texts had concentrated on less familiar content or had been more structurally complex, it is not clear that the instruction to delete trivia would be so easy to follow. One must have some background concerning the content knowledge to enable one to recognize trivia readily.

There are two general classes of problems that can impede effective studying: inefficient application of rules and strategies, and impoverished background knowledge. The child may lack the necessary strategies to engage in appropriate learning activities and we have ample evidence in the literature of childrens' lack of strategic knowledge. Alternatively, children may lack the requisite knowledge of the world to understand certain texts that presuppose adequate background experience. In principle, instruction can be aimed at overcoming one or both these problems.

Consider instruction in rules and strategies. If adequate performance depends on the application of a set of rules and these rules can be specified exactly, then it should be possible to design instructional routines that introduce the uninitiated to these possibilities. For example, providing children with concrete procedures to help them continue studying and self-testing until ready for a test improves study performance in young children (Brown, Campione, & Barclay, 1979). Instructing students in efficient self-question techniques is also an effective training procedure (Andre & Anderson, 1979). Sensitizing young readers to the logical structure of text and the inherent meaning in certain pas-

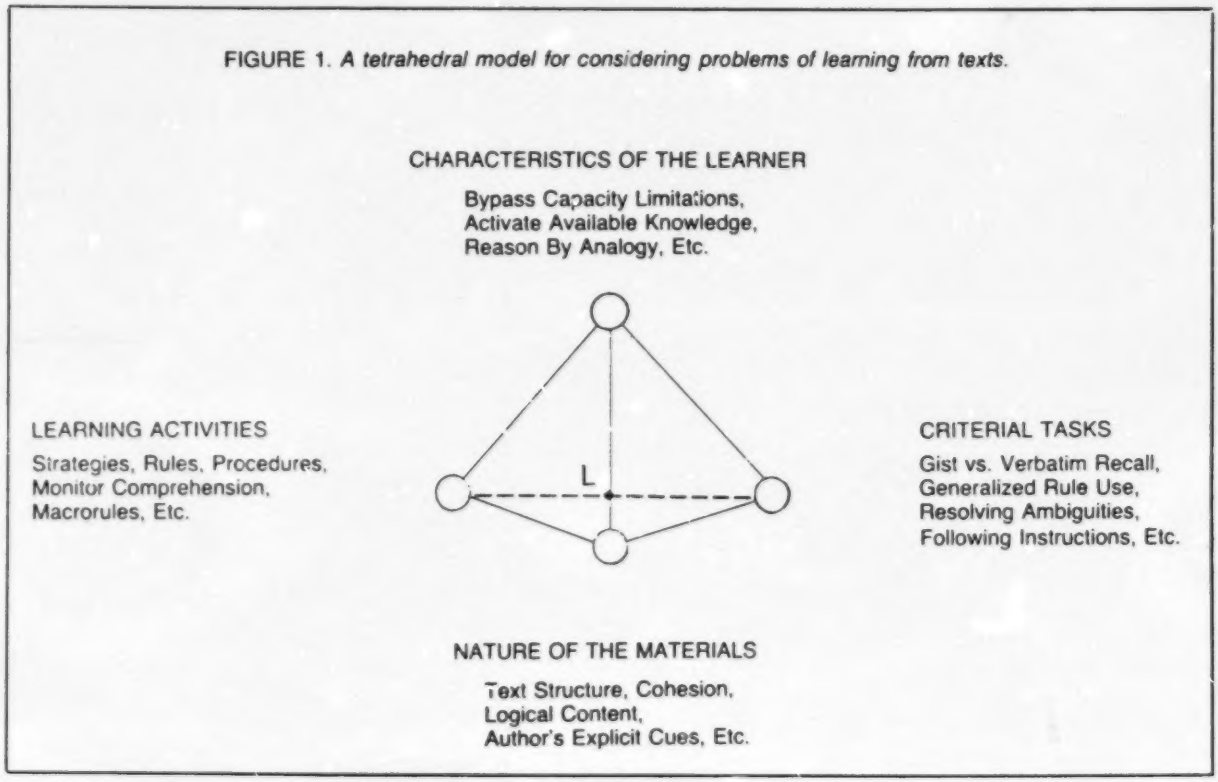
sages again helps the less able reader (Bransford, Stein, Shelton, & Owings, 1980). The more detailed understanding the instructor has of effective rules for reading and studying, the more readily can those rules be trained. Our work with summarization rules is a case in point. Merely instructing students to make their summaries as brief as possible and to omit unnecessary information was not an explicit enough guide for junior college students. Exact specification of the rules that could be used to achieve this aim, however, was an extremely effective instructional routine. Quite simply, the more we are able to specify the rules used by experts, the more we will be able to successfully instruct the novice.

The second major impediment to effective learning is a deficient knowledge base. If the text deals with topics that the reader is not familiar with, it will be difficult for the reader to understand the significance of the material, to select main points and disregard trivia. One answer to this problem is to select texts that deal with familiar material. But, whereas the teacher may actively attempt to provide the requisite background knowledge for a particular text, she/he cannot always do this. To overcome the impediments to effective reading caused by a lack of knowledge, one must set about increasing the learners' general store of information. While this is no doubt desirable, even necessary, it certainly takes time. The only prescription for training which follows a diagnosis of deficient knowledge is one of general enrichment, which few schools have the resources to provide.

The task of instructing effective learning from texts is complex and difficult. But, if we keep in mind the interactive nature of learning excellent insights into how we might help students become more effective text processors emerge. In Figure 1 we have modified a tetrahedral model of learning adapted from Jenkins (1979), Bransford (1979) and Brown (in press a) to emphasize its relevance to the task of studying from texts.

Imagine a learner considering a learning task from the viewpoint of the center of the tetrahedron. In designing a plan for learning, the four points of the model must be considered. We believe that this is the end result that cognitive training should strive for. Learners must themselves consider the four points and their interaction—perhaps as follows: (1) *Learning activities:* The learner should consider the available strategies, both general and specific. Specific strategies could be the rules for summarization just described, while general strategies could be varients of such general comprehension and study-monitoring activities as generating hypotheses about the text, predicting outcomes, noting and remediating confusions, and so forth (Baker & Brown, in press; Brown, in press b). (2) *Characteristics of the learner:* The learner should also consider his/her general characteristics such as a limited immediate memory capacity for meaningless materials and a reservoir of appropriate prior knowledge. Thus, the learner should not overburden his/her memory by attempting to retain large segments of texts, too many

FIGURE 1. *A tetrahedral model for considering problems of learning from texts.*



pending questions, too many unresolved ambiguities, and so forth (Baker & Brown, in press). The learner should attempt to tie the informational content into any prior knowledge possessed, to activate appropriate schemata (Anderson, 1977; Brown, Smiley, Day, Townsend, & Lawton, 1977), to seek relationships or analogies to prior knowledge (Brown, in press a; Simon & Hayes, 1976; Gick & Holyoak, Note 2) to see the information in the light of knowledge he/she already has. (3) *Nature of the materials:* The learner should also examine the text itself for the logical structure of the material, its form as well as its content. Although meaning does not reside in the text alone, authors are sometimes helpful in cueing meaning. They flag important statements by such devices as headings, subsections, topic sentences, summaries, redundancies and just plan "and now for something really important" statements. Students can be made aware of the significance of these cues and induced to actively seek help from such sources. (4) *Critical task:* The learner should consider the aim of the learning activity, the purpose of his/her endeavors; he/she should also be aware that different desired outcomes require different learning activities and thus learn to tailor efforts accordingly.

As psychologists interested in learning, it is important for us to understand the interactive nature of the tetrahedral model. As psychologists interested in methods for training effective learners, we believe that our main aim is to get the student to understand this point also. What we are advocating is an avoidance of blind training techniques and a serious attempt at informed, self-control training, that is, to provide novice learners with the information necessary for them to design effective plans of their own. The essential aim of training is to make the trainee more aware of the active nature of learning and the importance of employing problem-solving, trouble-shooting routines to enhance understanding. If learners can be made aware of (1) basic strategies for reading and remembering, (2) simple rules of text construction, (3) differing demands of a variety of tests to which their information may be put, and (4) the importance of activating any background knowledge which they may have, they cannot help but become more effective learners. Such self-awareness is a prerequisite for self-regulation, the ability to orchestrate, monitor, and check one's own cognitive activities.

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## Annual Meeting Reminders

Be sure to register now for this year's Annual Meeting if you have not already done so. Registration and Housing information was published in the November issue of the *Educational Researcher*. Forms may also be obtained from the AERA Central Office. Advance registration is available until March 5, 1981 and ensures early information about the program, a $1.50 discount on the *Abstracts*, and your choice of hotel reservations at guaranteed special rates. Advance registrants need only to pick up badge holders and copies of the *Program Supplement* at registration time. All AERA members receive the 1981 *Annual Meeting Program*. Additional or replacement copies will be available on site, at a cost of $4.00 each. In addition, the 1981 volume of the *Abstracts of Papers and Symposia* will be mailed in February. The price is $8.00 on-site. Preregistrants: Please do not forget to bring your badges.

For highlights of this year's Annual Meeting, turn to page 25.